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THE NAVAL AVIATION SAFETY REVIEW

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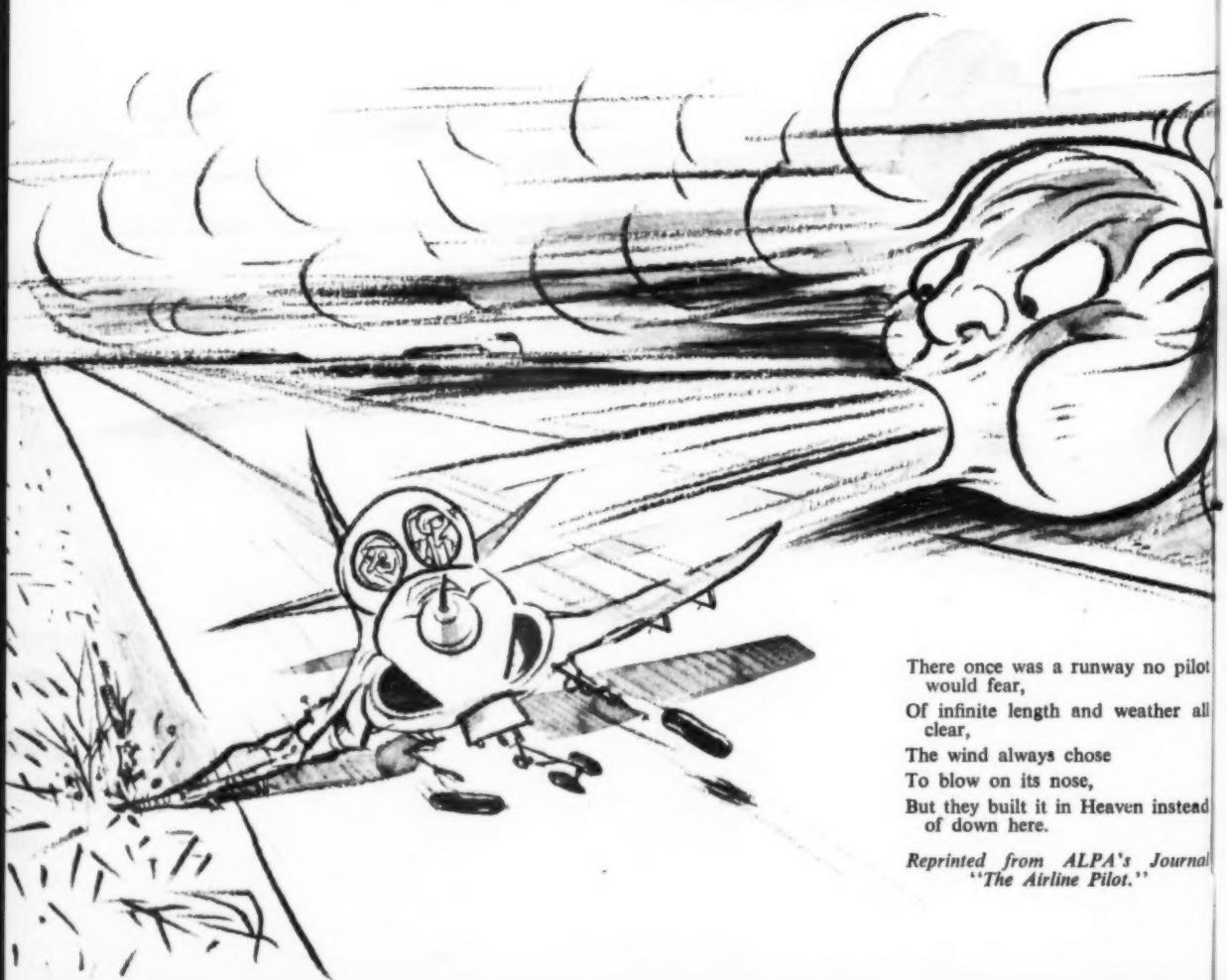
When Strong Winds Blow!

Velocity Is Not Always a Measure of Strength If It Is a Crosswind

by Jack Le Barron



There once was a runway no pilot would fear,
Of infinite length and weather all clear,
The wind always chose
To blow on its nose,
But they built it in Heaven instead of down here.

Reprinted from ALPA's Journal "The Airline Pilot."

Ever notice how the significance of the tower's wind information doesn't always hit home until the aircraft is wallowing around on final approach and the runway starts getting elusive. It slides mischievously away from the nose and *then* you start thinking, "crosswind technique, wherefore art thou?"

The wind seldom blows exactly down the runway and practically every takeoff and landing has some degree of crosswind. But if the yearly total of shore based takeoffs and landings are considered, crosswinds louse up a very small percent—at least to the extent that accident or incident paperwork has to be processed.

So when you do have to start thinking about the subject it is mostly in terms of a distracting nuisance—not really a thing which can ruin your whole day. That was a fine touchdown you think. Then with the breathtaking suddenness of a cat shot the nose slews off centerline, skidding rubber traces a black arc toward the runway edge, rudder and aileron flail rapidly: The airplane sags as an overloaded strut lets go and your whole day is ruined. Now you really start thinking.

One of the thoughts of a *Beech* pilot, as he gazed at his broken-legged bird, went like this: "I believe this accident could have been avoided only if I had been warned strongly enough to have warranted going to another field for a landing with a more favorable wind condition." His copilot added: "Each Navy tower could have a gust and crosswind diagram available and when conditions exceeded recommended limitations, they should notify pilots of this."

Gentlemen, it won't work.

In the first place you would have to distribute diagrams to *all* fields. Navy aircraft are not limited to Navy fields. Besides, tradition and common sense leaves command decisions to the cockpit; the ground announces the problem and the pilot picks his answer. Thirdly, where would you find recommended limitations for all models of aircraft flown by naval aviators? Over half the number do not offer limitations on crosswind operations in either the Flight Manual or NATOPS Manual, and this includes the *Beech*.

Right here we come up against a couple of questions. If *one* airplane has an official recommended limitation, should *all* airplanes have a limitation in the Flight Manual or NATOPS Manual? Are there planes whose characteristics are such that a limitation can be safely ignored? Or is the omission in a particular manual a detail which was inadvertently overlooked?

AWKWARD POSE—Alert photographer catches Jay Bird just before touchdown as pilot attempts to boot out crosswind crab with left rudder.

For discussion purposes let's assume there are some aircraft which might be unnecessarily restricted if a crosswind limitation were put in the flight manual. The T-34 makes a good example.

Neither the Flight Manual nor NATOPS Manual mentions a limit. The Training Command, however, sets 5 knots as the maximum 90-degree crosswind for a no-flap landing by a solo student at an outlying field.

The reason is obvious. A designated aviator can safely handle more x-wind than a student. And doesn't this bring out a philosophy for crosswind operations? The safe limit often depends on who is flying the aircraft. Since it came into wide use the A-4 (A4D) has picked up a reputation for lively crosswind antics; the NATOPS Manual notes 15 knots crosswind component (on the beam) as a critical limit and recommends a maximum of 12 knots but some graduates of Guantanamo's Leeward Point shrug somewhat unconcernedly when these figures are mentioned.

Whether or not it is safe to consistently exceed published crosswind limits, the fact remains that a limit becomes a guidepost for the pilot. It is a warning. He is standing on a hostile border; further advance will be contested. The individual's experience, proficiency and skill will determine how far into enemy territory he is capable of going.

It appears then, that even though the book makes no recommendations, there may be a need

for guidelines, or informal limits, for crosswind operations. The next question, of course, is how to obtain them. In this, we can continue to use the T-34 as an example.

When the surface wind velocity is less than 5 knots, it is considered a calm condition. At 5 knots, assuming it is a beam wind, the crosswind begins. Now if the T-34 were to be certified under civil regulations the criteria would be spelled out thusly: "There shall be no uncontrollable looping tendency in 90-degree crosswinds up to a velocity equal to 0.2 V_{so} at any speed at which the aircraft may be expected to be operated upon the ground. All landplanes shall be demonstrated to be controllable with no exceptional degree of skill or alertness on the part of the pilot in power-off landings at normal landing speed and during which brakes or engine power are not used to maintain a straight path."

V_{so} symbolizes the stall speed with wings level, power off, full flaps and gear down. In this condition the T-34 stalls at 49 knots. Twenty percent of V_{so} equals 10 knots and the aircraft would have to be satisfactory in a 10 knot, 90-degree crosswind. Remember, this is with full flaps and no brakes or engine power. If 10 knots were all the plane could take, the allowable crosswind component can be increased by using less than full flaps, say 5 to 10 knots, and further increased if brakes are available. How much the brakes help is open to question but it may be 5 or 10 knots if we consider that a USAF aircraft delivery group (fancy name for a ferry outfit) sets 25 knots as the maximum crosswind component for the T-34.

For a transport plane to be used in civilian flying several crosswind conditions may be established and then written into the manuals. One can be a value which is not marginal with the airplane's handling characteristics and operation of the aircraft in crosswinds greater than the value thus

Crosswind Component Information (In Knots)

Model	Flight Manual Limits	NATOPS Manual Limits	USAF Limits	Accident Board Recommendations	Remarks
F-8 (F8U)	10	15			
A-4 (A4D)	15				
A-3 (A3D)	15		(B-66)20		
C-130 (GV)	15		30		
C-47 (R4D)	16		30		
C-117 (R4D-8)				22	NASC recommended 16
C-54 (R5D)	18		30		
A-5 (A3J)	20				
AF-1E (FJ-4B)		20			15 for fam pilots
HU-16 (UF)	25				
C-118 (R6D)	30				
EC-121 (WV)	30				
P-3 (P3V)	30				
T-33 (TV-2)			20		
F-1C (FJ-3)			(F-86)25		10 for checkout/fam
TC-45J (SNB)			20		20 for civil use
T-28			25		
T-34			25		
C-119 (R4Q)			25		
C-131 (R4Y)			30		
UB-26J (JD)			30	22	
O-1B (OE)			15	15	US Army 12 (approx.)
A-1 (AD)					
EA-1E (AD-5W)				8	14-18, ½ flaps, wheel landing
F-3 (F3H)					
F-4 (F4H)					
F-6 (F4D)					
F-9 (F9F)					
F-11A (F11F)				12	Training Command
P-2 (P2V)					
S-2 (S2F)					
C-1 (TF)					
E-1 (WF)					
E-2 (W2F)					
T-1 (T2V)					
T-2 (T2J)					

GOOD SHOW—Audience at air show was treated to unplanned event when experienced pilot (900 hours in model) failed to retract flaps in 10-14 knot crosswind. Port wing lifted and wrap-around-bomber tracked downwind to leave runway after 4500 feet of roll. Pilot refused to repeat act for benefit of late arrivals.

specified is not necessarily a hazard. It is left to the discretion of the operator.

The second condition which may result from tests is a "critical" crosswind component "at a value which is considered the maximum up to which it is safe to operate the airplane on the ground, including takeoffs and landings." Operation above the maximum safe value is considered hazardous and the operator should do so only on an emergency basis (after comparing a few USAF and USN figures for the same basic aircraft it appears that 25 knots may be the "critical" limit for the T-34).

More than any other landing, the crosswind variety starts on downwind leg. There is first of all a crabbing drift correction to keep a crosswind from opening or closing the distance abeam the runway (an airplane exposed to a 12-knot 90-degree crosswind will drift 1200 feet in one minute, 600 feet in 30 seconds). The greater danger is being pushed toward the runway with a consequent wrapped up turn from the 180 spot. Then generally you will want to turn final far enough out so as to get settled down with a crosswind correction.

Finally, how much is the crosswind component? On dry runways it begins to be noticeable at about 8 knots (the point where section takeoffs are secured due to x-wind effect). If in a recip airplane do you want full flaps? If you are landing from a section or division breakdown and your flight manual says land on the upwind side of the runway in crosswinds, the landing interval should be increased since the usual "left and right" method would put somebody in poor position.

Airspeed poses a small problem. Should it be the same as a normal approach or need it be increased when there is a crosswind. During tests of crosswind landings aboard carriers the sink rate was slightly higher when drift was eliminated with a wing down. Assuming the normal airspeed-power combination was used, this increased sink would seem to be a natural aero-dynamic fact of life (small decrease in vertical lift component, increased drag from deflected control surfaces). The effect should apply to shore landings as well. However, the flight handbooks are not consistent on the subject.

For a crosswind landing ashore the A-3 (A3D) manual says a higher than normal airspeed should be maintained for approach and landing. The F-4 (F4H) says maintain normal approach speed. Other manuals, the A-4 (A4D) and F-8 (F8U), for example, say nothing about it.

In gusty winds it has long been an unofficial procedure to carry more than normal airspeed on final approach. In this matter, too, the flight manuals do not sing the same song. The A-1 (AD-6) manual says "for turbulent air, all approach speeds should be increased by 5 knots indicated." Nothing is said about it in the A-3 (A3D), A-4 (A4D), F-4 (F4H), and F-8 (F8U) manuals though the A-5 (A3J) book notes that on gusty landings increased power may be required to offset speed brake effect of lateral stick movements.

Is this another area which could use some guidelines? If techniques are handed down the line from pilot to pilot somebody is going to get the garbled word or no word at all. The traditional 2% who didn't get the word are still around. These days there just isn't as much humor in the situations they get into.

A good illustration of one of these situations can be gleaned from an endorsement to an accident report: "In view of the pilot's remark that the only way to land an A-1 (AD) on a field is three points in a near stall condition, a lack of knowledge of the crosswind effects on the EA-1E (AD-5W) in the landing or takeoff phase is indicated. Since the pilot was at one time a qualified instructor it is possible that his philosophy is accepted by other squadron members.

"In crosswind conditions there is a normal ten-

dency for the upwind wing to rise after touchdown resulting in directional control problems. Tests prove that the maximum crosswind component in which a three-point landing can be made with safety is 8 knots. If a wheel landing is made, a maximum crosswind component of 14 to 18 knots can be tolerated provided only ½ flaps are used and retracted before the tail is lowered to the deck."

The EA-1E (AD-5W) manual mentions that crosswind landings are best made with the tail slightly high and with somewhat less than full flaps so it is probable that the pilot in the above example was too quick to put the book down and jump into the cockpit. Of course we can ask "What crosswind tests?" And we can ask further, what was done to pass the word? At the time of this accident the *Super Spad* had only been in Fleet Service about 14 years.

The crosswind as an aviation problem did not really appear until the open acres of the "all-way" landing area shrank to a few hard surfaced runways. One attempt to relieve the situation resulted in so-called "cross-wind safety gear" in which swiveled wheels allowed you to touch down in a crab. The wheels aligned themselves with the track of the landing roll. A relatively limited number of civil aircraft use the equipment and USAF B-52's were fitted with a variation. However, tricycle landing gear actually took the sting out of moderate crosswinds. Difficulty and damage often begin around 15 knots.

What happens when you touch down in a crosswind? In general, air pressure builds up under the upwind wing and tends to raise that wing. The fuselage blankets the downwind wing reducing the lift on that side. Ground effect may also be involved in this wing lifting.

Directional control from the rudder diminishes as airspeed is lost on rollout and the nose has a tendency to swing. Whether or not the nose weathercocks into the wind or swings downwind depends on the square feet of flat plate area ahead of and behind the main gear—which is the pivotal point. The A-4 (A4D) has more area ahead of the main gear and therefore tracks downwind.

One point always stressed in crosswind landings is to touchdown without any drift across the runway. Why? If the airplane is drifting sideways it is the same as stubbing your toe. The airplane is off balance and leans in the direction of the drift, magnifying the upwind wing lift and directional control effects.

Learning to compensate for these things begins early in a pilot's life. Drift before touchdown is taken care of by lowering the upwind wing or crabbing until just short of touchown; after touchdown the yoke or stick is rolled into the wind (this may not be applicable if you have flaperons); when rudder control bleeds off, directional control is stiffened with brakes, nosewheel steering and differential power if available.

WET DECK—Failure to use proper crosswind technique was verdict when **Demon** stopped off side of runway. Rain, slick runway and 10-12 knot starboard crosswind set up accident. Pilot landed on left side of runway instead of touching down on or to right of centerline with slight crab in order to counteract drift. Also he did not lower nose immediately on landing.

Now throw in some gusts. In simple addition one plus one equals two. Crosswind plus gust doesn't always equal two—it may add up to three or four. The suddenness of the gust makes it inevitable that you are going to be slightly behind the airplane if it reacts. And once started, crosswind trouble is hard to stop. Accident and incident reports bear this out.

In figuring a crosswind component the maximum peak gusts should be used as wind velocity. And what *is* a gust? Weather Bureau criteria sets it as a sudden increase of 9 knots or more which does not exceed 20 seconds duration. In practice, tower operators may use the word "gust" to draw attention to the character of the wind even though the increase over the average speed may not be enough for an authentic gust. Tower operators also need to monitor wind conditions carefully on blustry days and keep fresh information (direction and peak gusts) going to takeoff and landing traffic.

On a dry runway it is in the low speed portions

of takeoff and landing where a crosswind generally starts pushing the pilot around. A gust (9 knots increase) makes the crosswind a little more aggressive. Where the spread between average velocity and peak speed is more than 10 knots the situation can become critical. The venerable TC-45J (SNB-5) provides an example for this, but of course the *Beech* can provide an example for nearly anything.

Surface winds were 8 knots gusting to 28 when the *Beech* pilot came in for a passenger pickup. "While trying to keep the aircraft on the runway," said the incident report, "a strong gust of wind lifted the port wing and forward section of the aircraft. The starboard rudder and vertical stabilizer came in contact with the runway." Since the wind was 330 degrees relative, the peak crosswind component was only 15 knots but the 20 knot spread between 8 and 28 knots made it unfavorable—and it would have been unfavorable even for a nosewheel aircraft.

One of the things given up in a crosswind is aerodynamic braking. Putting the nose wheel firmly on deck tends to offset weathercocking. Then, if nosewheel and rudder fail to do the whole job, differential wheel braking is the antidote. But already the landing distance is slightly increased because barn door drag is the only thing available to slow you down to the point where the tires won't blow when brakes are used. Without aerodynamic braking it may take longer to get to that point.

Differential braking serves to keep the nose pointed down the runway but it results in a decrease of effective wheel braking since most of the action is on one side. Won't this also give a slight increase to the landing roll?

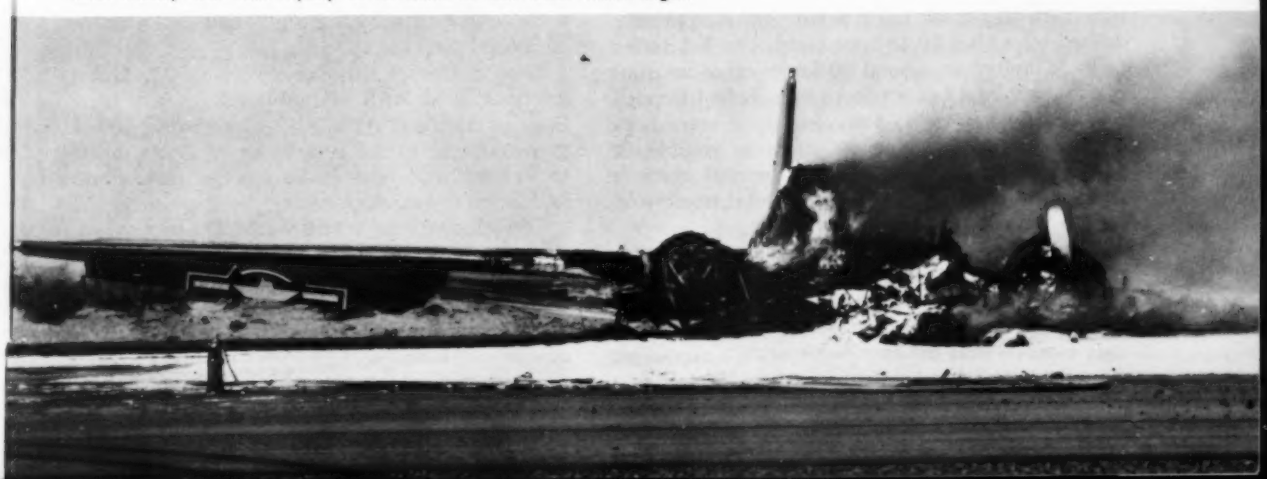
If it is a gusty crosswind and you carry some extra knots as a buffer this has to be dissipated over or on the runway and that means a few more feet.

What it comes down to is the fact that the runway is bound to shrink a bit with a beam crosswind. When the wind gets within 60 degrees of the nose, however, you can breathe a little easier if the runway length is critical. The effectiveness of the rudder to offset a crosswind depends on airspeed not groundspeed. Landing with a 15-knot wind at 90 degrees to the runway creates the same side force as if there were a 30-knot wind at 30 degrees. But in the second case there is a 26-knot headwind component which is of assistance not only in stopping the aircraft but in giving a greater degree of directional control. The headwind component enables the rudder to be effective down to a lower groundspeed in the landing run.

One final complication to a landing already burdened with a gusty crosswind can show up when the runway is slick from rain, snow or ice. During FAA tests to determine the effects of slush on the runway, a four engine jet transport was run through two inches of the stuff. There was an 8 to 10 knot direct crosswind and observers stationed near the upwind end of the runway saw the aircraft begin to weathercock as it entered the slush area. One observer remembered it as an awesome sight to see the tail swing around and that big transport come sliding down the runway at an angle.

When rudder control is no longer effective the same thing can happen to the "little" jets. Preserving directional control with the help of a nose-

NEVER TRUST A GUST—Pilot of C-117 (R4D-8) held in takeoff position until 90-degree crosswind dropped to 16 knots then commenced rolling. Seconds later aircraft developed uncontrollable swerve to right. Recording tape of anemometer showed wind velocity had risen rapidly to 30 knots at time when swerve began.



TRACKING THE SKYHAWK—Deep ruts lead to runaway bird roosting 900 feet off side of runway. Sudden gusts from nearby thunderstorm sent A-4 (A4D) on strange crosscountry. Note flaps retracted but speedbrakes in.

wheel steering and differential braking depends directly on the friction co-efficient or adhesion of the aircraft to the runway. In fact the word "adhesion", and lack of it, has something to do with the drift toward the edge of wet runway in a crosswind even when speed is high enough for rudder control. At touchdown, weight on the wheels is limited due to residual wing lift and a slick surface further reduces friction between tire and runway. Consequently, it is not uncommon for the crosswind to literally push the aircraft toward the side when directional control of sorts is still available.

If we accept the theory that a slick runway reduces the amount of crosswind that the airplane can handle, we still cannot say exactly how much the reduction is. Too many variables are involved. From those few cases where it is a clear-cut case of being pushed off the side, wind velocities were comparatively low; an F-8 (F8U) went off the side with a 5-knot beam wind; an F-3 (F3H) drifted off with a 10-12 knot wind. The F-1 series (FJ) is limited to around 20 knots on a dry runway but a 9-knot beam wind was sufficient to push one off a wet runway. Assuming these are exceptionally low wind velocities to cause trouble, it would seem reasonable to put the wet runway component at 70 to 80 percent of what is allowed for a dry runway.

A crosswind only occurs when there is no suitable runway aligned into the wind. But after a look at the "Flight Information Publication; Terminal (High Altitude)", (the jet plates if you prefer), it is evident that military fields with a single jet runway are becoming the order of the day. Some of these fields still have some fairly short, fairly old, alternate runways but they are being relegated to taxiways, parking areas or closed to heavy weight operations. Of course, single runway operations may also result from snow or a crash on the runway into the wind. Two incidents may suffice to show what can happen when strong winds blow.

One incident occurred at the end of a scheduled cross-country flight from NAS Memphis. "The T-1 (T2V) landing touchdown was normal, on the first usable 1000 feet of runway 01 at Andrews AFB. The aircraft was properly aligned with the left-hand side of the runway, and continued in a straight line for about 1000 feet, when it started to slide, still aligned with the runway, to the right. It continued to slide until striking a snow bank on the right edge of the runway, where it made a 90-degree turn to the right and came to rest 75 feet off the runway.

"The causes of this incident were: A lack of information at NAS Memphis on runway conditions at Andrews AFB, (b) a crosswind 260 degrees relative to the runway at 35 knots gusting to 45 knots, (c) poor braking action due to snow and ice on the runway.

"Weather at the scene was 3500 broken with 15 miles visibility (1¼ miles at the surface in blowing snow). A decision to divert and land at the only available alternate airport (NAS Patuxent River) would not have eliminated either the adverse runway conditions nor the crosswind com-

ponent, as NAS Patuxent River had only their north-south runway open to operations."

With such wind velocities it is hard to imagine that the airplane could have been kept on the runway even on a dry runway and this was practically an emergency landing.

A P-2 (P2V) provides the second example during a landing at Naha. The tower cleared the aircraft to land on runway 36 (there is only a north-south strip) and reported the wind as 080-degrees, 20-25 knots with gusts to 28.

"Approach and touchdown were very smooth with crab correction transitioned to wing-down in short final with 20 degrees of flaps. The aircraft was well aligned with the runway and approximately on centerline. After about 1800 feet of roll the starboard tire failed causing a slight swerve to the right (failure was considered due to side loads imposed by the crosswind); the port tire was immediately and intentionally blown to compensate.

"The combination of port braking and left drift from crosswind caused the aircraft to angle slightly to the left carrying it off the runway about 3300 feet from point of touchdown, and momentum carried it an additional 1000 feet across graded hard-packed coral to a point about 150 feet from the runway edge.

"At the time of the incident a special observation of the wind gave 070 degrees, 24 knots with gusts to 35 knots, giving a peak crosswind component of 33 knots. The tower was reporting less severe gusts which would have given a peak crosswind component of 27 knots.

"The flight was properly briefed, including crosswind considerations; the weather was VFR and forecast to remain so with little change in wind direction or velocity, which at the time of briefing was reported as 060 degrees, 17 knots with occasional gusts to 26 knots."

THIN ICE—Breaking action was reported poor when aircraft touched down. As it slowed, left swerve set in. P-2 (P-2V) went into snow 2700 feet from touch down. A 12- knot crosswind component caused "weather cocking."

It was noted by the board that neither the Flight Manual nor the NATOPS Manual provides a crosswind diagram or limiting component but only gives recommended procedures. Further, there is some variation in the limits observed by various commands, presumably based on differences of mission, pilot experience, or configuration.

"Had the actual severity of the crosswind/gusts been known prior to landing," continued the board, "operations should have been secured and the flight diverted to Kadena AFB, 10 miles northeast, for a more favorable runway."

Two ideas proposed by the board sounded good.

It was recommended "that crosswind diagrams with limiting components be published for *all* aircraft—including the older types still in use." It was further recommended "that when marginal wind conditions prevail, an alternate should be briefed just as under IFR conditions and utilized at pilot's discretion, based on considerations of safety, operational necessity, and pilot experience."

A paraphrase from the F-8 (F8U) NATOPS Manual sums up the crosswind situation very neatly: With good technique, it is possible to land an aircraft above set limits. On the other hand it is easy to get in trouble at figures well below the limit if poor technique is used. ●

SALVAGE—Crash crew polices up area following crosswind landing. Statistics show **Bug Smasher** to be especially vulnerable to crosswind when pilots are not current.

Looking After Each Other

By Major D. G. Lynch, USMC
Commanding Officer, VMF-122

A inexperienced young jet pilot, on his second night flight, experienced a generator failure. In the sudden frightening blackness, he became disoriented and lost sight of his leader. He attempted to extend the emergency unit and found to his dismay that it didn't work.

After the first few seconds, he managed to regain some semblance of control. With his flashlight wedged under his leg, at least he could see his basic flight instruments and maintain level flight.

Constantly fighting vertigo, he evaluated his situation. Unsure of his position, with no navigational aids, above a hazy overcast with only the weak light of a flashlight to illuminate the cockpit, he was on the verge of ejecting. Barely able to control his vertigo, he fought the desire to reach for the face curtain.

Suddenly, above and to his left, he saw a bright streak of light, which went out and then appeared again. As it flashed a third time he recognized it as an afterburner. Using the intermittent light of his leaders cycling burner as his only reference, he struggled to join up. Once aboard, he clung tight—tighter than he'd ever flown—for this was security. His leader, losing sight of him and guessing what had happened, had been vectored by GCI to his vicinity and had relied on the light of the burner to rejoin them. Both aircraft landed safely.

This story does more than point up the quick thinking and good headwork of the flight leader. It goes right to the core of the phrase, "teamwork." An excellent example of section integrity, it spotlights the idea of mutual support that is a basic part of Marine aviation.

It stands as proof, if proof were needed, that there are times when a fellow needs a friend; that often the mere presence of another can mean the difference between success and failure, safe landing or crash, even life or death.

When applied to aviation, "Togetherness" takes on a meaning different from that quality recommended by women's magazines. It allows a fighter pilot to concentrate on his target without worrying about his six o'clock. It allows a division leader to maneuver the enemy into the guns of his section leader. It permits a downed pilot the comfort the sight of his circling wingman gives, and the knowledge that help is on the way.

In time of war, we will be primarily concerned with locating and destroying the enemy—a poor time to start learning that individualism is an undesirable trait in a fighter pilot, or in any aviator.

All of us recognize that teamwork is what makes a smooth double play work, what breaks a halfback loose for 80 yards; we can easily apply the same quality to Marine aviation, with this important difference; we are not engaged in playing any games. We may not have a next inning, a next half, or a next season. Our team work is in the defense of our country, and the nature of the mission leaves no room for errors.

The close-knit unit that works together smoothly is undoubtedly more effective, more capable of handling situations that would tax larger, less well organ-

Suddenly above and to his left, he saw a bright streak of light.

ized units. Its members invariably consist of individuals who conscientiously apply themselves. "I can take care of MY job." They are willing to sacrifice. They'd rather be a partner in a winning combination than the star performer of a loser.

On the individual level, a leader realizes his effectiveness is decreased with his wingman; a wingman realizes how vital he is to the leader. And together they realize that neither of them could do the job alone.

On command levels, we are concerned with making the individual realize that he is part of a team—and that it is not a one-way situation where he only contributes to the whole, but that the team looks after him, too. Thousands of words can be written on the subject, but not until the individual sees the personal relationship that his outfit has with him, will he understand what the words are trying to get across.

Thousands of dollars and considerable time and effort have been expended to make him a part of a precise, well-coordinated military operation.

He is a vital cog in the defense of his country. Without him, his nation and the Corps is less able to perform its task. Alone, he is of little value.

Collectively, we have a job to do. And each unit can well advise itself; "Look after each other," we can't afford to lose a single one of you.

—2d MAW "Hot Dope Sheet"

All Pilots Read

Meatball, Doughnuts *Not Enough!*

IT takes *more* than a "diet" of meatballs and doughnuts to insure a good CV landing, as one F-8C (F8U-2) pilot found out.

According to the board, he hit the ramp because he failed to take note of his power setting while approaching the carrier. This they considered to be the major contributing factor to this accident. Although he was not injured the aircraft was damaged considerably.

The LSO commented:

"I consider this pilot the most consistent pilot in the squadron for OK passes. He had always had the best attitude I've seen towards MLP. He does not accept a low meatball pass in any situation, on the beach or on the ship, and on previous passes when he has gotten a low start from a CCA he has waved off on his own initiative. When a carrier pilot of this caliber hits the ramp I think someone should take a long look at this aircraft and its night carrier characteristics."

The board pointed out that the "basic four," meatball, lineup, doughnut and *judgement*, are insufficient to notice trends away from the optimum, especially at night. Pilots are highly encouraged to use the cockpit and angle-of-attack indicator and RPM indicator.

Suave Type

SUAVE people those airline captains, but perhaps not quite so suave as a chap who featured in a recent story I heard.

A couple of engines were acting up on a four-engined airliner. True to type, the Captain appeared in the passenger compartment with his little comforting speech—but wearing a parachute.

"We're having a spot of bother," he explained, "but there's absolutely nothing to worry about. I'm just going down to get some help."—*RAF "Flying Review"*

No Mystery

There are no mysteries in the field of accident prevention. Ordinary ability, common sense, and good judgment . . . applied with reason and a sincere desire to improve—will do the job.—*AFSC*

Stuck Mike Button

A case recently was reported to the Flight Safety Foundation in which all communications reception was lost because a microphone button had stuck down.

The symptom of this is complete silence in all headsets—the mike button being down mutes all receivers on the panel to which the microphone is selected. Furthermore, since there is no reception at all, no background noise will be heard even when the squelch is turned off.

The fastest way to isolate the offending microphone is to immediately turn all cockpit mike selector buttons to intercom, then try them, one at a time, on the desired transmitter.

Distance Measuring Equipment (DME)

The commissioning of only the DME portion of some future Tacan and vortac facilities has necessitated a deviation of portrayal for these facilities. Enroute supplement will list these facilities as DME with Chan Nr along with VOR listings. (BVOR-DME ELY 113.4 Chan 33). The Enroute Low, Mid and High Altitude US Charts will carry the DME under the facility box as "DME only on Chan Nr."

The DME can only be utilized by tacan equipped aircraft.

The abbreviation NSME (non-standard measuring equipment) is an FAA term replacing the VOR/DME designation for the civil distance measuring system. This non-standard DME should not be confused with the DME as associated with Tacan. Tacan equipped aircraft cannot receive non-standard measuring equipment unless equipped with a VOR/DME receiver. The NSME abbreviation as shown on the facility boxes of the enroute chart for VOR facilities denotes the availability of civil distance measuring equipment and on VORTac facilities denotes the availability of the civil VOR distance measuring equipment in addition to Tacan DME.

—*Flight Planning Document*

Fable for Aviators

by LTJG O. G. Kight

ONCE upon a time there were three NavCads who were summoned to the legal office. The legal officer read them a will left by a parachute rigger.

"For 20 years," the will read, "I kept equipment in prime condition for many pilots' emergency use. After I retired, I struck oil next to the uranium mine that my uncle left me. I would like you to share the joys of my labor and good fortune. You have been selected to receive one million dollars each, tax paid, on only one stipulation: Some time in the next five years you will be approached by a guardian angel and be asked to sign with a blue ballpoint pen for this money. You must do so within 15 seconds—that is all you have to do."

Four years later, the three pilots were on a bingo hop to the beach. For four years they had been almost religious in checking their ballpoint pens daily. Fresh refills every three months. Like all humans, they sometimes forgot. But, the guardian angel never showed. Until . . . in IFR weather, low fuel and systems failures, the guardian angel did show to all three.

With the first pilot, the carefully tended, daily-checked blue ballpoint pen worked. The second pilot had left his pen at home, but had borrowed one from his buddy. It worked—but it was black ink—not blue. The third pilot didn't wear the flight suit that had the pen in it, but tried to bluff it out with a red-inked signature stamp that he plopped on the wrong side of the check—because he couldn't see by the angel's dim glow.

But after all, two million bucks tax free is only money—even if you lose it.

Moral: The best equipment in the world won't save your life when you need it if you don't take care of it, if you don't use it properly or if you leave it on the ground.

Hot Takeoff Tips

TAKEOFF roll for the next few months will be a critical item for all jet pilots. Listed below are a few rules of thumb designed to keep you in the airfield and out of the fence.

Thumb Rules for Take-off Distance (Jet)

► 1% change in wind = 2% change in ground roll.

$$\frac{\text{Knots (wind)}}{\text{Knots (T.O. speed)}} \times 2 =$$

percent change in ground roll.

► 1% change in take-off distance for each 1° F above standard.

58.4° F is standard at sea level.

► Density Altitude = 10% change in ground roll for each 1000′.

► 2½% increase in distance for each 1% change in weight (increase).

Hot Weather Take-off Thrust (Jet)

Compressor Inlet Temperature (F°)		% of Thrust Available at 100% RPM
120°	You get	81.6%
110°	" "	83.9%
100°	" "	86.9%
90°	" "	89.7%
80°	" "	92.9%
70°	" "	96.3%
59°	" "	100.0%

—CNA VanTra "Flight Safety"

Jettisoning External Stores

FAA Radar equipped facilities are available to provide a Vector Service when requested by pilots in stated emergency conditions, to a designated drop area for the purpose of Jettisoning External Stores.

—Flight Planning Document

Flight Surgeon

"Destiny shapes our ends, but our middles are of our own chewsing."

This discussion is based on personal experience gained by the author during more than 500 storm penetrations in the Demon, Crusader and Phantom II. Much of the experience is applicable to all high performance jet airplanes. Certain conclusions are not in agreement with existing general criteria. This is not to imply that existing criteria are incorrect but that they are not applicable in all respects to high performance jets.

THUNDER and LIGHTNING

By LCDR D. Z. Skalla

Several reported thunderstorm accidents and incidents have involved airplanes which have been evaluated by the Naval Air Test Center (NATC) for severe weather operating characteristics.

Hundreds of thunderstorm penetrations were made without experiencing loss of or severe damage to an airplane. This has led the author to conclude that the human factor is a weak link in severe weather flying capability—perhaps the weakest link.

First, it should be made clear that the primary purpose of flying in thunderstorms at NATC was *not* for the purpose of investigating thunderstorms or of developing the thunderstorm penetration as a routine flight operations, *but to evaluate the airplanes and engines under the most severe natural precipitation conditions likely to be encountered during operational use*. However, a considerable amount of information concerning thunderstorm flying in general and airplane control techniques specifically was obtained.

Evasive action is still the first and most important rule to observe in any contemplated flight through thunderstorms regardless of how powerful and well built your machine may be. This becomes particularly important if the particular airplane happens to be restricted from flight in heavy precipitation.

In any aircraft, intentional flight through thunderstorms or towering cumulus clouds should be avoided unless the urgency of the mission precludes a deviation from course. The radar equipment in most high performance jets provides the pilot with a partial means of avoiding storm cells under instrument and night conditions; however, for various reasons (some understandable and others not at all logical) pilots are still hassling with thunderstorms. Many pilots apparently feel that the storm is being evaded if they just skim through the top. *This is most definitely erroneous as severe turbulence and a considerable amount of precipitation exists near the top in many storms.* Some of the most serious malfunctions experienced during severe weather evaluation flights at NATC occurred in fairly heavy precipitation and turbulence within two to three thousand feet of the top of thunderstorms which were in the development stage.

The following rules apply when the above is bypassed and the storm cannot be avoided:

► Prepare the airplane for severe weather. Though this seems like an automatic and logical step for any instrument flight, it is mentioned here for emphasis. To begin with the pilot must be thoroughly familiar with the purpose of the equipment in the airplane designed to combat the adverse effect of inclement weather, and when and how to use the equipment. Basically this preparation can be accomplished by flipping a few cockpit switches such as:

- Pitot heat: ON
- Engine anti-ice: ON (Yes, regardless of how many miles above the freezing level).
- Instrument lights: FULL BRIGHT at night.
- Thunderstorm lights: ON — if desired. (I prefer to leave them off unless absolutely needed. Other pilots prefer to turn them ON prior to entering the storm.)
- Any other switches mentioned in the appli-

cable section of the Flight Manual.

► Prepare for the rough ride ahead. Lap belt or torso straps should be tightened, the shoulder harness locked, and the seat lowered as much as practical. Lowering the seat is recommended strictly as a personal opinion method of reducing the possibility of lightning striking the pilot by surrounding him with more metal.

► Maintain the recommended penetration airspeed contained in the applicable flight manual. *This rule cannot be over emphasized. Improper airspeed control is probably the primary cause of many thunderstorms accidents or incidents.* The old adage: "set the power and fly attitude" doesn't apply so well to high performance jets. An increase in airspeed is to be expected due to water injection effects produced by the heavy precipitation. The throttle should, therefore, be adjusted to maintain the desired airspeed unless a climb is to be maintained. Since excessively low power will reduce engine anti-icing capability speed brakes should be used if a large throttle reduction seems necessary. Avoid rapid throttle movements as precipitation reduces the engine stall margin.

The consequences of exceeding the recommended penetration airspeed are not nearly as drastic as an error on the low speed end. Higher airspeeds add to pilot discomfort and airframe stress; however, neither are likely to become catastrophic.

An excessively slow airspeed is almost guaranteed to produce significant problems. Unfortunately this becomes a trap for pilots who erroneously try to top the storm by attempting to lift the airplane over the top by "horsing back" on the

stick. This may sound ridiculous but I can't think of any other reason why a jet pilot would enter a thunderstorm 50 knots or so behind the power curve where level flight probably could not be maintained at full power. The most probable consequence, other than control problems, of an excessively slow airspeed is a compressor stall, flameout, or both. This becomes increasingly probable at high altitudes (above 30,000 feet). *It is much safer to penetrate the most severe part of the storm at the proper airspeed than to "flounder" into the top in a near stalled condition.*

► If trouble develops, avoid panic and analyze the situation. Chances are that logical reasoning and determined efforts will get both pilot and airplane through the storm with the pilot still in command. Again, thorough knowledge of the flight manual is essential. A few of the most frequently encountered malfunctions are listed below with a brief discussion of recommended corrective action.

Engine Flameout

Maintain control of the airplane, utilizing emergency systems if necessary, and attempt an immediate relight. If the flameout can be attributed to excessively slow airspeed, increase airspeed. Keep in mind that engine relight capability increases with decreased altitude. The relight should be attempted as quickly as possible to avoid ice accumulation on the front of the engine which could possibly preclude a relight until a descent below the freezing level is made.

Compressor Stall

If the stall is intermittent a slight reduction in power may be all that is required. If the intermittent stall continues or if a steady-state stall develops, retard the throttle to idle momentarily. If the stalled condition still persists, shut down the engine, obtain a relight, and hope for normal acceleration back to cruise power.

Airspeed Malfunctions

Use angle of attack. If this instrument also fails resort to attitude control using the attitude gyro. Complete failure of the airspeed indicating system is easily detected; however, incipient failures can be readily detected only through continual cross-checking with other instruments, such as the angle of attack indicator. Blockage of the pitot tube by ice results in increasing indicated airspeed as altitude is increased and a decrease in airspeed with decreased altitude.

Electrical Failures

Extend the emergency ram air generator and maintain control of the airplane using partial panel if necessary. Momentary loss of the primary attitude indicating instruments is not as critical as it may seem, provided it doesn't occur at very low altitudes. A fast moving jet isn't rapidly displaced in attitude or flight path even in a monstrous thunderstorm unless the pilot effects the change.

Artificial Feel Malfunctions

Simply hold the stick force required to maintain the desired attitude and airspeed. One type of malfunction occurs only in airplanes with a ram air operated feel system, such as the longitudinal control artificial feel systems in the *Demon* and *Phantom II*. Failures of this nature are likely to induce a feeling of disorientation initially, followed by a conclusion that the airplane has been bent. Again, familiarity with the control system and applicable warnings in the flight manual will enable the pilot to correctly analyze the problem.

I would again like to emphasize that the primary policy in regard to flight through thunderstorms is, *don't*. This point is not emphasized to indicate that thunderstorm flying is inherently dangerous, but because penetration through a storm containing hail or heavy concentrations of ice crystals will result in considerable damage to airframe components, such as the radome, antenna fairings, and other fiberglass parts. Of course, heavy hail will also modify the smooth curvature of leading edge metal surfaces.

If out of necessity (urgent mission) or poor planning, a pilot of a high performance airplane finds himself in a hassle with a thunderstorm, I am firmly convinced that the odds are vastly in favor of the pilot and machine, provided:

- the pilot keeps a cool head,
- abides by the above rules, and
- is thoroughly familiar with the severe weather characteristics of his machine.

The cool head is attained through proficiency and confidence in one's instrument flying ability and the latter through diligent study of the Flight Manual and NATOPS Manual.

Thunderstorm flying most definitely is inherently dangerous if these requirements are not fulfilled or if the airplane is drastically deficient in all-weather suitability. ●

LCDR SKALLA is a graduate of the U. S. Naval Test Pilot School (Class 25) and a member of the society of Experimental Test Pilots. While attached to the Service Test Division at NATC he made more than 500 thunderstorm penetrations in Demon, Crusader, and Phantom II airplanes and conducted four flights in Hurricane Donna in a Demon. He has logged 4400 pilot hours including over 500 in the Demon, 200 in the Crusader, and 250 in the Phantom II. Presently attached to the U. S. Naval Postgraduate School, Monterey, California as a student.

Scheduling Pressures

By LT F. H. Cohan Norfolk AMD Quality Control

IN the relationships between aircraft operators and aircraft maintainers there is often a tendency to "put the cart before the horse."

Despite the increasing emphasis being placed on Quality Control and on related ground and flight safety, aircraft are sometimes arbitrarily scheduled, with *demands being made* on maintenance *that the schedule be met*—regardless of the in-work status of the aircraft or the scope and nature of maintenance yet to be performed.

Quite often these demands are conveyed as having been established by a VIP or Senior Officer, and are usually accompanied by implications of unpleasant repercussions in the event the demands are not met. In most cases, this action is undoubtedly taken by the scheduler *without the knowledge of the officer being referred to*, probably to avoid an expression of disapproval from the Senior Officer's or VIP's in the event his wishes are not carried out. There is also a reluctance to obtain facts and inform the user of the actual circumstances.

In most cases the person, for whom or in whose name this covert pressure is being applied, has become familiar with the variations of aircraft availability over the years. Ordinarily he could and would, given an opportunity, *understand legitimate reasons for maintenance delays*. If known, this overzealous projection of his wishes would probably not be appreciated, since it could result in jeopardizing his life and the lives of people flying with him, as well as cause destruction of the aircraft. A comprehensive report to the VIP or Senior Officer concerned would give him the option of deciding whether it might be advisable to make other arrangements (use another aircraft; postpone the flight, . . .). In the event that he then elects to curtail the scope of proper maintenance, he can do so with knowledge of the fact that there will be hurried, unfinished, or deferred work done on his aircraft. Around-the-clock maintenance, in unheated hangars, with undermanned and weary crews, operating under a barrage of telephone calls, questions, and impatient urging is not conducive to high standards of either safety or quality control.

The ever possible consequence of this practice could be in an unpleasant image of twisted metal and torn bodies and careers? Here indeed can haste make waste!

Why should our less critical motor transportation vehicles be given better treatment than our aircraft. When a vehicle is scheduled for a Preventive Maintenance Inspection, or turned-in for needed repair, it remains "in-work" until completed. When necessary, a substitution is made and accepted. Does it not seem reasonable to accord the same consideration to maintenance of aircraft?

Aircraft maintenance and adjustment procedures are time consuming. There are no magic tricks or acceptable short-cuts by which their accomplishment can be safely foreshortened. The man performing the work is just as concerned over finishing his assignment and getting the aircraft in an "up" status, as the flight personnel are eager to use it, perhaps even more so! His is the responsibility for knowing and certifying that the machine is in fact airworthy.

In the matter of putting the "squeeze" on the maintenance man rather than informing the senior user of the unpleasant facts, it is well to contemplate the words of Confucious, *"To know what is right and not to do it is the worst cowardice."* ●

Spotting the Deck

The pilot and crew departed from the ship in an A-3 (A3D) on a routine training flight. The flight and all conditions were normal up to the time the pilot called "meatball" following a night CCA to the ship.

A half-moon was shining causing a clear and distinct visual horizon. A few scattered clouds were reported at 2500 feet and the visibility was unlimited. This was the pilot's first night landing since reporting to the squadron from the CRAG. The flight had been scheduled with optimum conditions (weather, sea state, a close divert field), and he was to make this landing on one of the largest and best equipped carriers in the U. S. Navy.

The approach was commenced slightly fast, on glide slope and on centerline. Shortly thereafter, the aircraft was on speed and the approach looked steady in all respects until about five to six seconds from the ramp.

At this time the pilot eased power and the aircraft was observed to go below the glide slope. The LSO called, "Hold it up, hold it up — wave it off, wave it off." The aircraft continued to go below the glide slope, struck the ramp and boltered. The ramp strike caused serious damage in the main landing gear area and after portion of the fuselage.

During the final critical part of his approach the pilot either failed to recognize that the aircraft was going below the glide slope or having recognized this condition, failed to take corrective action until a fraction of a second before the aircraft struck the ramp.

Why didn't the pilot take corrective action sooner? It is difficult to assume that a pilot with even minimal night carrier landing experience can actually watch the meatball go low, turn red, and possibly disappear off the bottom of the lens without taking some sort of action. The pilot was obviously not scanning the lens. *Why wasn't he?* The board had this to say:

What are the CO's prerogatives when a weak pilot reports to his squadron?

"A factor which may have influenced the pilot's action is the illusion of being high close-in. Unlike most other CVAs, whose angle deck lights are toed-in, this ship's parallel angle deck lighting and island location make the illusion more pro-

It is realized that a precise definition of the cutoff point for a weak pilot is impossible. Many weak starters improve with time and experience. Then again some don't. The accident described here is not intended to single out any person or organization. Its purpose is to encourage an increased drive to insure that the best possible aviator is delivered to the operating squadron.

nounced. The pilot had been extensively briefed on this illusion. (*Previously discussed in "Ramp Strike", February '63 APPROACH.–Ed*)

"Another factor which may have contributed to the pilot's actions was an exceptionally bright night and the flight deck could easily be seen."

After boltering, the pilot was told to divert to the beach. The pilot replied that he was unable to reach the nearest divert field because of rapid loss of fuel. While the barricade was being rigged, and approximately five minutes after striking the ramp, the aircraft caught fire while close aboard the carrier at an altitude of 1500 feet. Shortly thereafter, the aircraft was engulfed in flames and slowly descended ahead of the ship where it crashed into the sea. Only one crewmember bailed out successfully.

How did this pilot allow himself to get into a position resulting in a ramp strike? Flight conditions were more than optimum. He had "run" the deck in the morning, accumulating six day landings. He received a very comprehensive briefing on night carrier operations. This pilot made his first night carrier approach in the squadron under the most favorable conditions that it was possible to provide, and yet he hit the ramp.

One Factor

The pilot involved in this accident was known by the command to have a marginal background for the type flying in which he was engaged. For the past six years he had been in a proficiency flying status during which time he flew an average of 90 hours per year in SNJ, C-45 (SNB) and C-47 (R4D) aircraft. The pilot had never flown an operational straight or sweptwing jet before being assigned to A-3s (A3Ds), except during jet transitional training in 1954. In two years of operational flying in an A-2 (AJ) squadron, and in the subsequent six years of proficiency flying he had not flown a single flight in a jet aircraft. One endorser stated, "Such lack of interest is indicative of a definite lack of motivation. . . . It is my contention that this pilot should not have been ordered to an A-3 squadron. With his amount of experience in propeller driven aircraft and apparent lack of motivation for jet flying, it would have seemed more logical to assign him to other duty."

Another endorser had this point to make:

"The Level Readiness concept is based on the theory that pilots can be delivered to the operating squadrons and fit into the program with a minimum of warmup time. This concept has proven successful in most cases. The squadrons operating in the forward area must be able to use all their pilots without restrictions. Operational situations arise that require flights in bad weather, day and night. Quite often the pilot will be faced with landing aboard in severe weather despite the efforts of the ship to avoid such situations.

"The detail officers must maintain an awareness of these facts when deciding on assignments of officers with weak backgrounds. In addition, the Combat Readiness Air Group should review the background of all pilots and be encouraged to take issue with the detailers on receipt of an officer who will require more than the normal amount of training. Thorough and proper screening of all pilots should be accomplished first, at the detail desk and second, in the CRAG."

However, there should be no restrictions placed against pilots of propeller background and limited or no jet experience in making the transition to jet aircraft; provided, that motivation has been previously demonstrated and that the pilot is believed to be above average in ability.

Another Factor

In this case, not only was the pilot extremely limited in carrier and high performance aircraft experience but he had struck the ramp with his tail hook and tail skag during A-3 (A3D) carrier qualifications with the CRAG. One endorser recommended that any pilot in the CRAG involved in a carrier landing incident or accident be carefully evaluated before being completed and sent to a fleet squadron. The accident board recommended that CRAG squadrons adhere to the letter as well as the spirit of a type commander's recent letter which stated, "Absolutely, do not accept into fleet carrier squadrons any pilot whose initial night carrier landing performance is marginal. The denial of carrier aviation for such cause may seem severe but in the long run will save both lives and aircraft."

What are the squadron commander's prerogatives when a weak pilot reports to his squadron?

There is only one course of action available. He must fly the pilot under the most strict supervision and evaluate his performance. In this case the pilot had been carefully groomed to ensure that he had the very best possible circumstances under which his performance could be evaluated. It is tragic that a fatal accident occured during this period of observation.

Only adequate screening of pilots by the detail officers, who should have definite guidelines, and the Combat Readiness Air Group Training Squadrons will eliminate the frequently fatal screening which takes place in an operational squadron. ●

Divert or Disaster

Anymouse Special

During a recent Mediterranean deployment in A-4s (A4Ds), I was launched one evening on what I thought would be a routine instrument and practice inflight refueling hop. The hop was proceeding as planned and briefed until I called the meatball on my approach to the ship.

Pri-Fly waved me off for priority and approach instructed me to enter the bolter pattern and call abeam with my state. My fuel state was okay so I was not worried about being waved off. On the next pass I encountered a great deal of trouble controlling the meatball and as a result boltered. My fuel state was still 2000 lbs. plus, so the thought of bingoing never entered my mind. My next pass resulted in a waveoff for poor ball control technique and was followed by a bolter, a waveoff, and another bolter.

On the third bolter my fuel was 1300 lbs. Approach control gave my downwind information. When I called the 180 with my state of 1200 lbs., I was instructed to clean up and that my signal was bingo. I requested one more pass which was turned down with, "Negative, your signal is bingo, steer 358 degrees-65 miles to the ——— Airport." I immediately cleaned up and turned to the bingo heading commencing a climb to 20,000 feet.

I was not tanked inbound as the tanker had gone down prior to launch. The primary divert field had no tacan or homer so I found myself tracking outbound on the ship's tacan. The divert field was equipped with omni, UHF, and VHF. Attempts were made to contact the field tower but I was unsuccessful. I later found out their UHF receiver was out. The ship gave me the divert field weather as 3000 scattered which later turned out to be varying from 200 overcast to 1500 broken.

An airborne A-3 (A3D) which was in the area of the divert field at the time, was told that I was inbound. He made several attempts to contact the tower both on UHF and VHF but had no success. The area over the field was overcast. Since the A-3 (A3D) was equipped with omni he began making omni approaches to the field in an attempt to locate it for me and lead me in utilizing the buddy system. His approaches were unsuccessful as the runway lights were not on and with the marginal weather conditions the field could not be sighted.

The A-3 (A3D) pilot orbited the area of the field and spotted a commercial aircraft making an approach. He tailed in behind it and about 2 miles from the field the runway lights were turned on and left on after the commercial jet had landed.

In the meantime I had arrived overhead with 800 lbs. and had no field in sight since I was above the overcast. I could see lights up and down the coast through the overcast but could not recognize any of the towns.

I turned to the southwest and started down in hopes of finding a hole to get through to take a look around. I leveled off before entering the overcast as I could not find a hole. I went to the Mayday squawk on the IFF and Guard channel on the UHF as the ship was having trouble picking me up. The CCA officer on the ship picked up my squawk and told me he was going to penetrate me out to sea through the overcast and bring me back inbound to the field. I was beginning to get nervous due to my fuel state. The CCA officer sensed this from the tremor in my voice and said "I'm going to bring you in boy, I'm going to bring you in." His voice and words of reassurance calmed me down immediately and gave me a feeling of security. I penetrated through the overcast and turned inbound at half my altitude.

The overcast along the coastline was about 500 feet so I was just skimming along the bottom of it watching my altimeter very closely so as not to fly into the water. As I approached the coastline I noticed several ships rigged with in-port lighting anchored in the bay. I informed the CCA officer of this and he told me that his radar was land locked and he had me at the wrong town. He said to follow the coastline and I couldn't miss the airport about 15 miles away. I started up the coastline but went IFR and missed a right turn at the coastline. I began a shallow climb as I knew there were mountains in the areas and I didn't care to leave an airplane and myself splattered on one.

A few seconds later I popped into VFR conditions and found myself in a valley with mountains sticking up into the soup

on both sides. I thought to myself how lucky I was not to have hit anything and for about the tenth time checked the location of the face curtain ejection handle and proper positioning of the seat. A quick look and the fuel gage revealed 400 lbs.

The CCA officer was still in radio contact with me but had lost radar contact since I was in the valley. He told me to stay close to lights so I wouldn't hit anything. Proceeding up the valley which paralleled the coastline I suddenly went over the roof of a building which was sitting on a ridge running across the valley. I hadn't seen the ridge and for a brief instant as my lights lit up the roof I was petrified. I am certain I hadn't missed it by more than 10 feet. I again checked the face curtain with both hands but again decided against ejecting.

The CCA officer asked me what my fuel state was. I replied that my state was 300 lbs and asked for a Charlie time overhead for the next day. This request seems rather ridiculous now since at the time ejection was imminent. He gave me several Charlies times which I wrote down on my kneeboard. On the ship my squadron commander was making the decision to have me head to sea and eject since he felt my chances of survival would be much better ejecting over the water than over mountainous terrain at night. He got out the first word to tell me to eject when the A-3 (A3D) overload spotted my rotating beacon through a hole and turned me right 90 degrees. He brought me down through another valley and out over the city. He asked me if I had the runway in sight. I answered with a negative. Then thinking I had spotted the airfield at 11 o'clock said, "Roger, I have it at 11 o'clock." He told me it was at my 3 o'clock and when I looked I found myself looking down a runway.

The A-3 (A3D) pilot told me the wind direction and to enter downwind for a right-hand approach to the field. My fuel state at the time was 150 lbs. I left the gear and flaps up, the speedbrakes in, and turned off the 180 with 100 lbs indicated. I was high and fast so reduced the power to IDLE, still climbing into the soup but keeping the runway lights in sight through the overcast. As I rolled wings-level on final about a quarter of a mile from the end of the runway I lowered the gear, flaps and speedbrakes with the throttle still at IDLE. I was high and fast intentionally in case I experienced a flameout.

I was sure at that instant I could have made the runway if I did flameout. I never noticed the blinking approach index light since the hook was up nor do I recall looking at the gear indicators. This pass had to get me on the deck since there wasn't going to be another.

I commenced a flare as I passed the threshold lights and touched down about ⅓ of the way down the 6800 foot runway with the throttle still at IDLE. As I turned off the end of the runway and started up the taxi way I heard the engine die, then catch again. I looked at the fuel flow gage just in time to see it come up to idle fuel flow, then drop to O. The fuel gage said 50 lbs. The sound that followed sounded to me at the time like death.

It wasn't until then that I actually realized how close I had come to losing an airplane. Many thoughts went through my mind for the next few hours as I was wondering how I was so lucky to still be around. I definitely owe my life or at least an airplane to the quick thinking and reassuring words of the CCA officer and the keen eyeballs and help of the A-3 (A3D) pilot and his crew for spotting me.

Next morning a starter probe arrived from the ship and I was started, using a *Caravelle* jet starter. My return to the ship was very heartwarming after having spent the last 20 hours in an anti-exposure suit.

UNCOVER

On my first day back from 10 days TAD an AF-1E (FJ-4B) unexpectedly became available late in the afternoon. Due to paperwork I turned it down. But after 15 minutes of conscience searching I decided it was better to take flights when they were offered.

I rushed down, filed a quick VFR flight plan—hurry, hurry. Just time for 1.3 (maybe) and still not tie up the line crew's liberty. More rush, rush. Maybe can get at least 1.0 now. With the help of the plane captain and his assistant I rushed around and got strapped in.

Shortly after liftoff vibration started—so severe I was unable to keep my feet on the rudder pedals. I climbed to altitude and checked rudder boost ON and OFF. Mach trim checked ON and OFF. Visual check of rudder by another airborne pilot was to no avail. A descent to 10,500 feet and a switch to manual fuel made no difference in the vibration.

Landing seemed to be the only solution so I switched back to primary fuel and dumped fuel.

While approaching the field I noticed the angle of attack indicator showing 30 units. Finally it dawns. Angle of attack stuck at 30 units. Rudder shaker shaking its head (and my feet) off.

After uneventful landing I get the angle of attack probe cover removed (it had held it at 30 units) and I made a test takeoff and landing. Everything OK.

Autopilot, Vertigo Aid

It was a cold dark night about 300 miles off the coast. The sea was calm, and there was a high overcast with a low broken layer of clouds at about 1000 feet. There was also patchy fog in the area.

Immediately after the cat shot, my copilot switched to departure and received our vector to the contact area. I climbed to 1500 feet between the layers and finally picked up and joined loosely on my leader. Enroute to the area I checked my autopilot and set up the ordnance panel for Julie operation. My copilot meanwhile was busy collecting his Julie board, flashlight, and drawing compass, then began to catch up with the flight narrative.

As we arrived in the area, the flight leader went through the formalities of relieving the on-station flight. The flight we relieved reported intermittent Julie contact; however, very poor weather was hampering progress.

As they climbed out to our altitude, the leader ordered me down to continue operations. When I passed through 900 feet, I was in the goo; and as I leveled off at 300 feet, I found I was still in the goo.

My copilot saw the smokelight we were looking for, so I headed toward the area. I passed over the light and commenced the standard Julie pattern. With this, the copilot went to his Julie board and began his role as tactical coordinator. This meant

ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Forms for writing Anymouse Reports and mailing envelopes are available in ready-rooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

I must fly and still remain oriented about the smoke light in the goo.

All went well for a few minutes. Then, the switch of attention from the gages to the smoke took its toll. I had the worst case of vertigo ever, and I knew my copilot had his attention set in plotting fixes. So, I rolled the wings level, punched the autopilot, and trimmed for a slight climb.

Well, it scared hell out of me. We found that we were able to fly almost as effective a pattern at 1000 feet above the low stuff and had 700 feet more margin for error.

In my opinion the autopilot is a real lifesaver in a vertigo situation if you know it works.

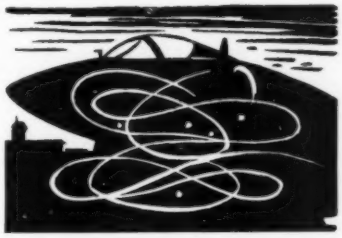
Night Flare

After a night landing, an A-4 (A4D) pilot noticed his starboard brake was out. By pumping he did manage to get some braking action and was able to slow up enough to turn off the duty runway. However, he could not bring the aircraft to a complete stop with the remaining brake and he shut the aircraft down after first advising the tower of his intentions.

The pilot climbed out of the cockpit and by using his kneeboard and navbag was able to halfway chock the aircraft. But without any external lights (no aircraft battery) other pilots turning off the duty runway became aware of the situation only through the frantic wavings of the pilot with his flashlight.

Fifteen minutes after shutdown the first crash truck arrived at the scene. During this time two or three aircraft had passed the shutdown aircraft and after passing their jet blast would put a severe strain on the jury rig chocks. Unfortunately, the crash truck didn't carry chocks but finally a tow tractor was brought to the aircraft and towed it to the line.

It is recommended that towers notify aircraft of the presence of a shutdown aircraft and divert traffic if at all possible. Pilots must realize the importance of a flashlight and be prepared to use survival flares or fire tracers to mark stopped aircraft.



Happy Hour Tale

Following a photo run along the coast I turned out to sea and began a descent in burner. When passing through 20,000 at Mach 1.2 I decided to reverse course and proceed to the fix for an approach. To do this I planned an Immelmann, in afterburner. As I approached the vertical I realized that I had not pulled hard enough.

The aircraft passed through the vertical with about 250 knots. I was attempting to ease it over the top when the burner blew out with a loud bang. My first thought was the engine had flamed out so I brought the throttle around the horn, hit the igniters and put the throttle in IDLE.

Meanwhile, the F-8 (F8U) had started a slow roll to the left. Charts, approach plates and other miscellaneous items began to float about the cockpit. I attempted to correct the roll but got no response from the ailerons. Assuming the engine had not relit, I deployed the RAT and cut the throttle off.

At this time the aircraft was inverted and started a slow turn. I neutralized the controls hoping it would recover by itself. It made a couple of slow turns then with a jerk, righted itself, and entered a spin to the right. When I was certain the plane was spinning I took both hands and blew the landing droop. It took both hands because of the violent gyrations that the aircraft was going through.

I applied correction for a right spin and checked the altimeter—28,000 feet. The aircraft spun about three times then slowed down. I neutralized the controls but it started into a left spin. Again I applied spin correction and after several turns the spin slowed down, followed by neutralized controls.

Now I entered a falling leaf type maneuver which stabilized at about 60 degrees nose-down and 60 degrees left bank. As the airspeed passed through 200 knots I leveled the wings and started a gentle pullout. By now I was at 18,000 feet indicated.

Maximum speed in the pullout was 280 knots. Decelerating through 250 knots I put the emergency generator ON, hit the igniters and with 30 percent showing on the tachometer, went to IDLE. The engine lit immediately. I secured the emergency generators and went back home at 200 knots. At sometime during the "maneuvers" my attitude gyro failed.

Flight Safety Officer comments: This is the first time that I can remember a hairy tale being brought out and discussed in an APM. Most stories like this are heard at happy hour. ●

GSE Lighting

HEADMOUSE

Dear Headmouse:

I offer a possible solution to the problem of shielding lights on line vehicles during night operations. As indicated in Fig. 1, place a disc of highly reflective material in the center of the vehicle's light. Disc size should permit 1¼" space around the headlight. For my experiments I used aluminum foil, which has an added advantage in that it is easily shaped to the curvature of the headlight. The foil can be secured in place by masking tape.

The masking disc shields the bright source of the head lamp from the observer. By observing the illumination pattern of the headlight, both with and without the shield, it was estimated that about a 10% degradation ensues when using the disc. The slight decrease in illumination is attributed to the reflective capability of the inner side of the shield—which reflects the light rays back into the lamp reflector until the ray is subsequently emitted through the outer zone of the headlight (see Fig. 2). The dead zone is estimated to be about the shape as shown in Fig. 3.

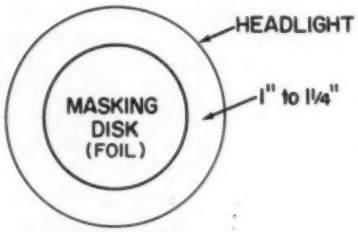
A more permanent installation could be achieved by using a metal (high reflective surface) disc, or possibly by painting the disc with an aluminum paint.

D. M. REEDY, LCDR
ASO, VP-703 (NAS DALLAS)

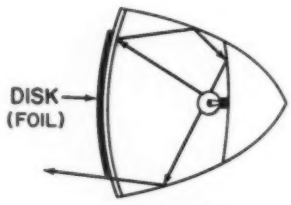
► Thank you LCDR Reedy. Others might want to give the idea a try. If it works out okay, please let us know.

Very resp'y,

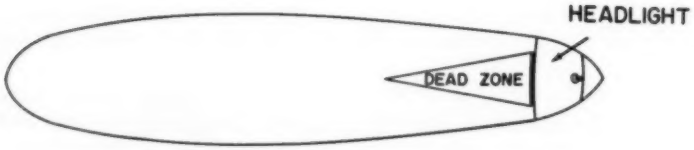
Headmouse



FRONT VIEW
FIG. 1



SIDE VIEW
FIG. 2



TOP VIEW
FIG. 3

More On Pencil Flare Gun

BuWeps provides this additional information on the pencil flare gun discussed in Headmouse, APPROACH March 1963.

"Based on satisfactory results of safety tests, we plan to procure and issue these devices even though the devices tested were not up to the standard . . . normally required for stocking and issue of pyrotechnic devices. . . . The red flares and pencil type ejector will be issued as an interim signal to supplement existing rescue signals and markers. BuWeps will not be in a position to specify shelf life or to recommend a replacement rate for flares already in the Fleet since these devices were not procured under any controlling Bureau documents. We do plan to carry on normal surveillance of the product. . .

Headmouse P. S. These items are designated: Signal Kit,: Illumination, EX 79 Mod O consisting of 1-Projector, Signal Surface, EX 31 Mod O and 9-Signal, Hand Fired, EX 80 Mod O. No Federal Stock Number assigned at present.

R1820 Engine Failure

Dear Headmouse:

Enclosed is a summary of R-1820 engine/cylinder failures encountered at this activity during the past 18 months. These failures occurred while operating two C-117D (R4D-8) aircraft.

M. E. HALLADAY
ASO, MCAS, QUANTICO

► Your summary of 14 engine changes has been compared with NASC data. It supports the trends established and recorded in the 1963 edition of the "R1820 Engine Summary," just off the presses. If you have not received a copy drop us a line.

Very resp'y,

Headmouse

Slat Control

Dear Headmouse:

A discussion has arisen among some squadron pilots as to the source of the force which causes the A-4 wing slat to extend.

One school maintains that the slat extends at a speed at which ram air effect is not sufficient to hold it in and gravity pulls it out or in a G condition which increases the apparent weight of the slat, enabling that increased weight to overcome ram air effect.

The other school maintains that ram air may be the force that holds the slat in at low angles of attack and or high speeds, but that it is an increase in the force acting at right angles to airflow over the slat at high angles of attack which overcomes ram air effect and pulls out the slat.

Any help we can get from you in APPROACH or by letter, including appropriate diagrams if applicable, will be gleefully received by the winning side, be there one.

RICHARD S. LINN, LTJG VA-164
ROGER M. CLARK, VA-164
USS ORISKANY (CVA-34)

► First of all, to settle the argument, the second answer you submitted is correct.

Figure 1 depicts the force distribution and force vectors acting on an airfoil at a low angle of attack. Let us say that vector A is the vector that represents the sum of ram forces and vector B is the sum of lift forces acting on the slat. In breaking down these vectors to their respective horizontal and vertical components, the horizontal component of the lift vector will be less in magnitude opposite in direction from the horizontal component of vector A. In this attitude the sum of the horizontal components is positive and the slat will be held in.

Figure 2 depicts the force distribution and vectors acting on an airfoil at a high angle of attack.

Again breaking down vectors A and B to their horizontal and vertical components, it can be

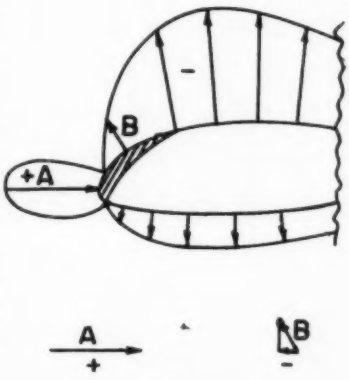


FIG. 1

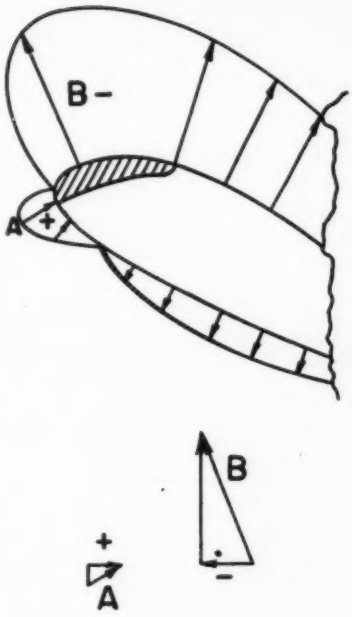


FIG. 2

seen that the horizontal component of B is larger in magnitude and opposite in direction from the horizontal component of A. The sum of these vectors is negative and the slat will be pulled out by B or as your second answer states, "the force acting at right angles to airflow over the slat. . . ."

Very resp'y,

Headmouse

P. S. The winning side owes Headmouse a beer. ●

Have you a question? Send it to Headmouse, U.S. Naval Aviation Safety Center, Norfolk 11, Virginia. He'll do his best to help.

A common feature of the s uat
is the method of reporting A
"incidents." From that point the
it could be mostly a question of
the airplane back on deck. For o
second or fraction of an inc d
was a close call or calamity. Don'
apparent innocence of sever pl
tell a chilling story.

Gallery of CLOSE ONES!

1. Barricade became necessary for F-8 (F8U) after jet made one arrested landing and cat shot. Pilot was then unable to lower hook for second trap. With fuel below "bingo" barricade was rigged.

In test, hook subsequently actuated normally 100 times, then failed to release once again. Accumulation of sand and grit in uplock assembly tabbed as cause.

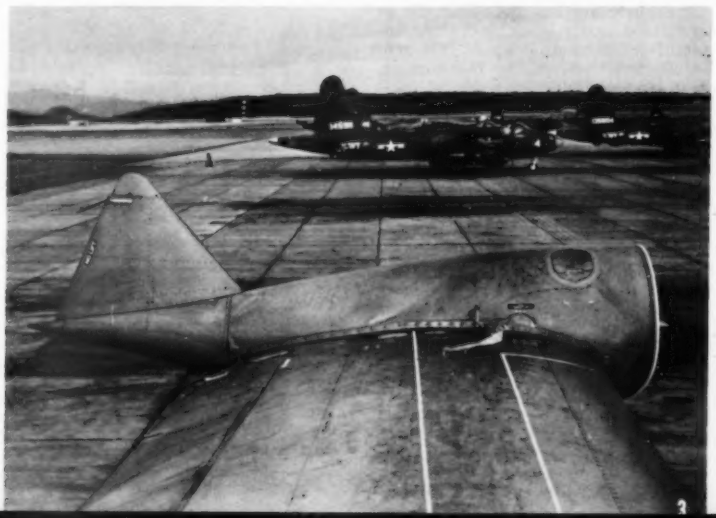
2. Following individual night takeoffs, F-8 (F8U) wingman attempted running rendezvous. Leader's exterior lights were on dim. At 7000 feet, city lights ahead and Texas sky full of stars apparently caused wingman to mistake leader's position.

Lead aircraft suddenly loomed up in front of wingman who attempted to roll right. Wingman passed close astern and felt jar similar to weak jet wash. Radio checks brought out no reports of difficulty in either plane and section continued cross country.

No damage discovered on night post-flight. Next morning plane captains found that underside of wingman's nose had scraped across right tip of leader's UHT (stabilizer).

3. Forward third of this P-2 (P2V) tip tank is broken off. Lower portion (not visible) is smashed and torn. The PPC was in right seat demonstrating MAD tactics on a scheduled day training flight. Upon completion of a starboard cloverleaf MAD tactic at 100-200 feet and 150-160 knots, a port turn was commenced.

2



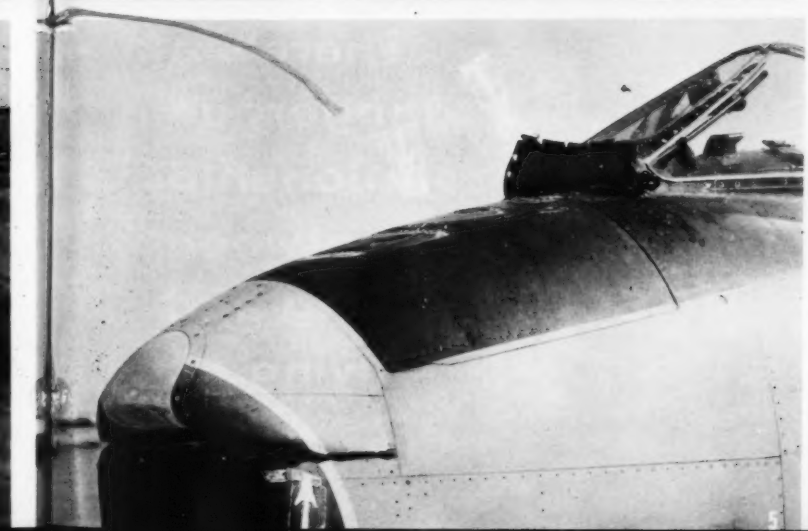
3

the s uations pictured here
rting. All are classed as
point hey differ. For some
stion of pilot ability to get
ck. For others, only a split
n inch decided whether it
ity. Don't be misled by the
sever l photos — they may

During turn, while discussing the tactic just completed, the pilot felt aircraft descending and noted pressure altimeter passing 80-100 feet. Recovery was initiated immediately by rolling out of turn and simultaneously pulling back on the yoke. It was not completed before the port wing tip tank struck the water.

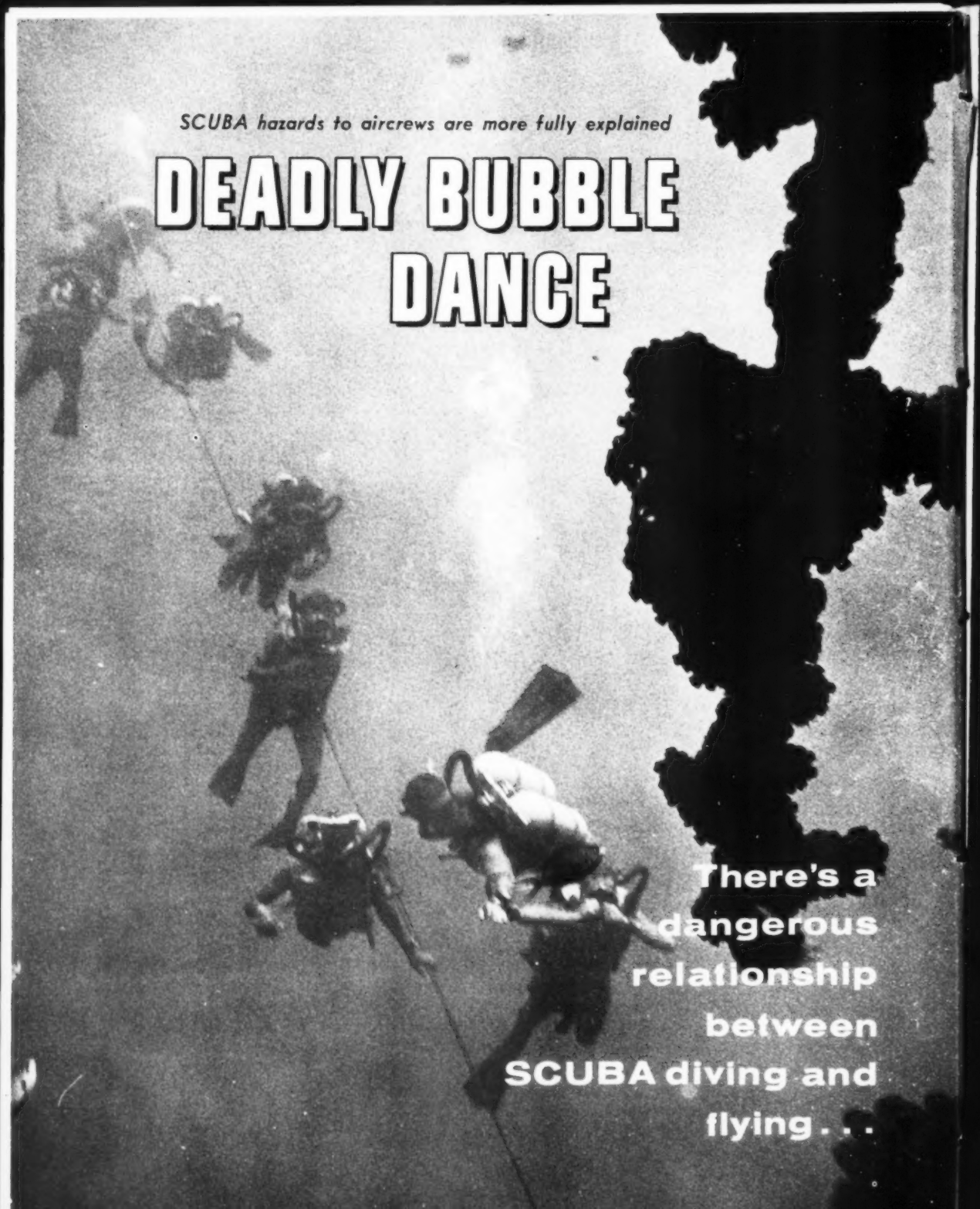
4. HU-16C (UF-1) appears to be victim of "wetting down" party as it weaves unsteadily toward doorstep (ramp). Left seat pilot was making first water landing with slight crosswind from right. Plane bounced, yawed right and left wing dropped. On next impact with water, port float dug in, tore off and port engine quit.

Engine was restarted and amphibian taxied home. Handbook recommends 40 degrees flaps and crewmen on undamaged wing to balance loss of float.



5. Old Fury may have been furious when it was punched in the nose but skin damage on top section was more critical for pilot. On GCI training hop, radio contact with GCI could not be established and pilot decided to make low-level navigation trip.

He crossed over a lake, made 180 and made second pass over lake, this time at low-low level. Two 3/8-inch galvanized steel, 7,200 volt power distribution cables crossed lake (ultimate strength 10,000 pounds for each). Aircraft plowed into both cables at point where power lines measured 30 feet above surface. ●



SCUBA hazards to aircrews are more fully explained

DEADLY BUBBLE DANCE

There's a dangerous relationship between SCUBA diving and flying . . .

Many of us SCUBA dive—i.e., diving with self-contained underwater breathing apparatus—or have friends who dive. But not all of us are aware of the hazards involved in diving nor in the dangerous relationship of diving to flying.

Recently an experienced SCUBA diver complained to medics of mild chest pain on deep breathing and a slight discomfort on swallowing. Five hours before, he had been diving to depths of 50 feet or less for a period of two hours. During this time he experienced mild chest discomfort on one of his dives, but this seemed to clear on surfacing and he ignored his symptoms, but after returning to land, this discomfort returned and became more intense.

Upon examination it was discovered that he had air under the tissues of his neck, both shoulders and in the sac around the heart, trachea, and esophagus. If he had gone on a flight to several thousand feet this would have been fatal due to the expansion of the air in his chest and neck, yet his symptoms were minor and he was reluctant to see a physician.

Under pressure all gases go into solution more readily and under a reduced pressure go out of solution—look at your soda water bottle: when the pressure is released, bubbles form. Air is composed of several gases, oxygen, nitrogen, carbon dioxide, predominantly, each of which go in and out of solution at different rates under pressure. Fortunately oxygen and carbon dioxide go in and out of solution rapidly, thus we are able to transfer these gases readily via our lungs to and from our blood stream. But nitrogen is a different story, it transfers slowly and consequently may effervesce, or form bubbles, anywhere in the body, not just in the lungs, when pressure is released. These deadly bubbles produce what we call the bends, more technically called decompression sickness.

This was first noted in caisson workers who constructed underwater tunnels. These gas bubbles formed in their joints and abdominal organs causing severe pain which resulted in their doubling up their joints and abdomen for relief and thus was commonly called the bends. The nitrogen slowly dissolves in the blood and tissues under a given pressure, and then slowly released to form bubbles when the pressure is decreased.

For example: SCUBA air is breathed under 60 lbs per square inch at a depth of 100 feet, but air at sea level on returning to the surface is breathed at 15 lbs per square inch. This same air is breathed at 10 lbs per square inch at 10,000 feet altitude and 5 lbs per square inch at 20,000 feet altitude. If a nitrogen bubble began to form shortly after a diver began surfacing from a depth of 100 feet, by the time he reached sea level it would be 4 times the volume and then if he were to fly to 20,000 feet it would be 12 times the volume. Can you imagine what this deadly bubble might do in the brain or heart?

Now we begin to see the dangers of SCUBA diving as compounded with flight. Remember the bends can occur in high altitude flight without a previous episode of SCUBA diving, but after SCUBA diving the bends can occur in flights of 8000 to 10,000 feet, much lower than would otherwise be expected.

Tolerance to the bends varies with the individual but about 90% of symptoms will appear in 12 hours after surfacing. MATS requires all aircrew members participating in SCUBA diving within 12 hours of a flight to depths below 15 feet to obtain a medical clearance if they are participating in flights with cabin altitude in excess of 5000 feet. This is a good rule for all aircrew members to follow since dangerous symptoms may seem relatively minor. See your flight surgeon, for he is trained to recognize the early symptoms of dysbarism and could possibly save your life if consulted in time.

UDT men demonstrate the use and handling of the "seeing eye".

In the past, dysbarism (bends) in the air had been practically unheard of at altitudes below 20,000 feet. Yet, recently, several members of the crew of a civilian airliner developed this disturbance at only 7000 feet. Investigation showed that all the sick men had been SCUBA diving immediately before the flight.

The combination of exposure to deep-water pressure, plus exposure to decreased pressure of altitude immediately thereafter, results in a physical situa-

tion similar to that experienced by the diver returning to the surface after prolonged deep-sea pressure.

This factor must be considered in flight and indoctrination schedules. Aircrew members should refrain from diving below 15 feet for at least 12 hours before scheduled flights or pressure chamber indoctrinations. Those who must fly or undergo pressure chamber training after diving should be kept at cabin pressures of 5000 feet or below.

Another case of dysbarism is on record, though not associated with SCUBA diving, serves to emphasize important points.

". . . Cabin altitude, upon reaching 40,000 was 30,000 feet. After 10 minutes at this altitude, the subject reported numbness and tingling of the fingers, pain in his right knee and a severe cough that produced a clear sputum. He had to remove his mask several times in order to expectorate. The IP in the front seat noted that the pilot appeared to be in moderate distress and was removing his mask and adjusting his helmet quite frequently. A slow descent was started to 27,500 feet. It lasted 25-30 minutes. Cabin altitude, upon reaching 27,500 feet was 20,000 feet. The IP in the front seat turned on the defroster in order to increase the cabin pressure. The pilot reported a marked remission of his symptoms during this descent. The remainder of the flight proceeded at this altitude, total of 2:20 after takeoff.

"Fifteen to 20 minutes after take-off on the return flight, he complained of nausea and was noted by the IP to be holding his head and appeared to be extremely uncomfortable. He stated that he felt as if he were going into shock. The return flight was made at about 25,000 feet with a cabin altitude of 17,000 extremely uncomfortable and was coughing and nauseated and continued to feel his impending collapse. At the termination of the flight, he went immediately to the flight surgeon's office. There, his complaints, his general appearance and condition, his blood pressure and his significant skin findings were noted, and the subject was admitted immediately as an emergency case."

The most common symptoms are joint pains and abdominal distress which are produced by bubbles lodging in joints and abdominal organs. Bubbles of nitrogen also frequently lodge in the skin resulting in pain, itching and burning.

The bubbles become deadly when they lodge in the lung circulation and produce chokes and when they lodge in the brain and spinal cord and produce dizziness, double vision, nausea, fainting, abnormal reasoning power and eventual death.

Several things should be kept in mind if you should be affected by decompression sickness in flight. The first and most important is to *land* or if this is not possible descend to the lowest possible altitude immediately, since the only immediate treatment is recompression, to attempt to return these effervesced bubbles of nitrogen into solution. *Do not move or massage the area involved since this may break the bubble into many small bubbles which may lodge in a more vital area.*

Remember, if you develop symptoms in one joint you may be forming a bubble at the same time in the brain, so do something about it immediately; don't wait until you are paralyzed or black out to get alarmed. A good rule of thumb in diving is never dive below 50 feet since symptoms of decompression sickness rarely occur above this depth. Oxygen is not the treatment for nor will it prevent decompression sickness. Recompression is required so do not try home treatment but report to the nearest physician for treatment.

Adapted from—USAF Physiological Training Program, Newsletter No. 48, 1962 ●

Navy Policy on SCUBA

All personnel who have engaged on a recreational or line of duty basis, in SCUBA or any other type of diving utilizing underwater breathing apparatus of any type to depths in excess of 30 feet (or who have been exposed to equivalent pressures in excess of this depth in a recompression chamber) should not fly to cabin altitude in excess of 18,000 feet (or make decompression chamber ascents above this altitude equivalent) within 12 hours following the termination of such a dive or recompression chamber descent.—*Aviation Medicine Division Bureau of Medicine & Surgery*

SHROUD CUTTER

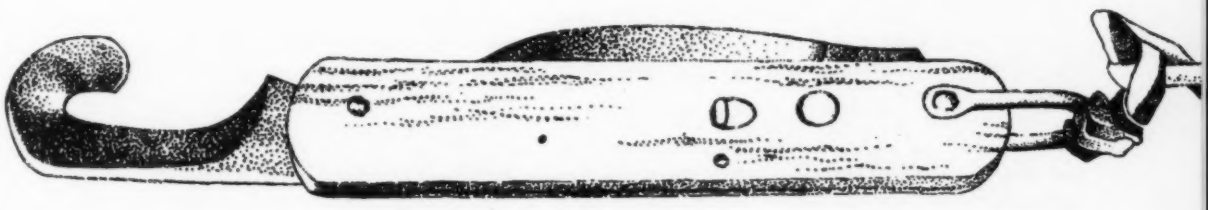
"As the *Crusader* arced right toward the bow and at an altitude of 80 to 90 feet, I pulled the ejection curtain. After one forward somersault, the parachute blossomed with no more than a light tug on the straps. Then I entered the water feet first in what seemed to be a most gentle entry. I could see the ship bearing down on me at close range and I thrashed furiously to get out of its path. I contacted the ship first at a point about 20 feet aft of the bow on the port side, and thereafter was spun around like a top as I bounced along the ship's port side unable to get away from the suction.

"I had by now removed my upper rocket fastener fittings and shortly thereafter took off my hard hat and oxygen mask because the parachute shrouds were encircling my head as well as legs. I reluctantly let go of my helmet and tried to free my upper body and head from the encircling shroudlines. I finally passed aft and free of the ship without any tendency to be sucked into the screw area. All three of my flashlights were on and had been on since first going into the water. The salt water must have seeped into them through the switches (causing them to actuate)."

(The pilot was wearing his one-cell flashlight attached to his torso harness, a red penlight in the left arm pocket of his flight suit and a standard two-cell light on a cord around his neck. It is not known where the pilot had his two-cell light secured. However, it is not prudent to eject from an aircraft with a flashlight dangling loosely about the neck.)

"I then took off my flight gloves which were as slick as grease after becoming wet (no JP-5, just salt water) and put them into the pocket on the upper left leg of my flight suit, and removed my orange shroud-cutter knife from that same pocket. After releasing the leg rocket jet fitting, I commenced cutting shroud lines and continued to do so until the parachute was clear. I then put the knife back into the pocket and broke out my .38 revolver. I fired three shots toward the carrier and two more toward the oncoming destroyer. (Tracers should be fired 90° to the bearing of the rescue ship or aircraft.—Ed.) I did not reload at this time as I felt other lines or straps tugging on my right leg. I replaced the revolver in the holster and drew out my sheath knife and proceeded to cut several more straps and shroudlines loose. I didn't think it wise to inflate the raft at this time because of all the miscellaneous lines still wrapped around that container and my right leg.

"By this time the DD was approaching anyway and with the superb bouyancy provided by my torso harness life preserver, I elected to save raft inflation until either later or until I really needed it. The DD had all of my lighted flashlights in sight and proceeded alongside. I climbed up a cargo net, aided by a line around my waist which had been thrown to me while I was in the water. I elected to bring everything up the cargo net with me including the yet unopened raft if for no other purpose than to show the effectiveness of that recently issued orange shroud-cutter." ●



SLEEP

The poets have called sleep "great Nature's second course" and the "chief nourisher in life's feast." But over the past 20 years laboratory experiments have been unlocking the secrets of sleep, and there is much more to it than what the poets picture.

For instance, the importance of sleep has been elevated. Living organisms have as much need for sleep as for food, air and water. We sleep more to rest our brains than we do to rest our muscles. But no one really knows exactly why the brain requires sleep, or for that matter what sleep is.

The cerebral cortex—gray matter—of the brain seems to benefit especially from sleep. It is there that the higher faculties of imagination, reasoning power, judgement, and conceptualization are found.

Extensive studies on sleep have been conducted at Walter Reed Army Institute of Research in Washington, D. C. More than 100 soldiers volunteered to help. Much information was gained concerning jobs requiring constant alertness—guard duty, signal men monitoring communications devices, aviators, radar screen scanners, and so on.

They found that the cerebral cortex emits electric brain waves at the rate of about 10 a second while we are awake. As we fall asleep, these waves gradually slow down to the rate of two or three per second. Billions of tiny nerve circuits close down and our plane of consciousness sinks.

Under prolonged sleep loss our entire nervous system begins to behave like a motor that needs a tune-up. The system misfires, runs normally for awhile, then falters again. What actually happens is that among our normal short, snappy brain waves will be found momentary stretches of sleep pattern. This makes us drop off into micro-sleep. For brief snatches we'll be sound asleep, even though our eyes are open and we think we're wide awake. Our heartbeats slow down, our consciousness blanks out, and some of us even have dreams.

Tests showed that micro-sleep lasts about one-tenth of a second, and occurs at the rate of two or three an hour. As hours of sleep-loss mount, the lapses take place more often and last longer, perhaps two or three seconds. As the tired brain gets even more fatigued, it craves sleep so hungrily that it will sacrifice anything to get it. It is then that we can't resist micro-sleep for a few seconds, even while flying through a thunderstorm.

Another serious effect of sleep loss is its effect on memory and perception. Many of those who took part in the experiments found it impossible to retain information long enough to relate it to the task that they were supposed to perform.

Those of us who work at jobs in which we are required to hold many factors in our minds at once might still ponder the risks of loss of sleep. A tired man may be able to get through routine tasks, but can he as an aviator integrate wind direction, airspeed, altitude, and glide path to make a safe landing?

In the research on sleep it also became evident that lack of sleep caused other disturbances. These disturbances are similar to those produced by alcohol, narcotics and oxygen starvation. Perceptions grow fuzzy, our sense of timing is off, our reflexes are a little late, and values slip out of focus.

Most of us pay another price when we stay up later that we should—irritability. Lack of sleep is frequently the real trouble when we lose our temper unnecessarily. It can make normally-cheerful people feel moody and depressed. Intensified by still more lack of sleep, a normally patient aviator may lose his temper at a time when he should be calm and collected.

The amount of sleep an individual needs is a question that has plagued scientists for years. They really don't know exactly. Although some people get along on less, most of us will be healthier and live longer if we get a full eight hours.

The amount of sleep needed will depend to a large extent on what we do for a living. Mental workers require appreciably more sleep than those who do manual labor. This is because it takes longer to replenish the nervous energy expended by brain work. It should be noted that aviators and highly trained mechanics are classified as mental workers. Even your dreams have not been spared the prying eyes of the scientist. They have discovered that dreams

allow the cerebral cortex to take a rest. Studies have shown that if we do not dream, we become exhausted and irritable. This is true even when we have had our usual amount of sleep. Under normal conditions, we dream several times a night. The so-called nondreamers among us simply forget their dreams. We spend one to two hours a night dreaming. Dreams occur during light sleep and not during deep sleep. The time element of dreams is similar to the actual event. It is most interesting that two-thirds of them are in black and white and the rest in full color.

While the scientists were worrying with the problem of those who do not get enough sleep, they did not forget those who sleep more than is considered necessary. One startling discovery was that too much sleep can be just as deadly as too little sleep!

Here is what happens. During sleep CO_2 (carbon dioxide) builds up in the blood, replacing oxygen. If we should sleep too long, the CO_2 would begin to act as an anesthetic, causing us to sleep even longer thus making the concentration of CO_2 greater still. However, you needn't worry. We've got a built-in-mechanism that keeps us from dangerously oversleeping. This is fortunate because it is estimated that 16 straight hours of sleep could actually kill some people. (Reference attributed to Dr. Herbert Suher, Duke University, *TRUE* Magazine, Nov. 1961.)

But suppose you don't really want to sleep, or can't sleep, before making a flight. Is there something you can take that will keep you awake? Well, there is always coffee. The important drug in coffee is caffeine. The amount of caffeine in two cups of coffee affects appreciably the rates of blood flow and respiration. In small amounts it may be considered a nervous system stimulant and will keep most people awake for a few hours. But in excessive amounts, caffeine may produce nervousness, inability to concentrate, headaches, and dizziness.

What then is the answer to the sleep problem? It is simply that the proper amount of sleep for you is necessary every 24 hours if you are to remain alive in this flight business. Even a slight reduction in the amount of sleep (25 to 50 per cent) can induce significant mental impairment without any subjective feelings or physical clues. One should make every attempt to sleep or at least to nap just before going out for preflight, because the longer you've been awake before starting a task, the greater the danger of micro-sleep.

—U. S. Army "Aviation Digest"

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HELMET PROTECTS

ON a Tacan penetration in deteriorating weather with a minimum safe approach altitude, the A4C (A4D-2N) pilot was cleared to commence descent from 1200 feet at his discretion. As he descended very slowly, he appeared to be low. Although his altimeter indicated 350 feet, he felt something strike the port wing. (This was found later to have been a tree.) He added power to 100% and raised the nose, the aircraft struck some more trees and began to settle. The pilot pulled the face curtain and successfully ejected.

"I felt no jolt when leaving the aircraft," the pilot stated. "I had a tumbling feeling and could see the reflection of flames shooting out of the bottom of the seat. The chute opened normally and stopped me abruptly. My body swung forward at a considerable angle; my helmet struck the ground and the chute started to pull me through the weeds. The quick release harness fittings were easy to open and I was free. . . ."

Although his helmet was damaged considerably, the pilot was uninjured.

Stay Put and Help

AFTER successful helicopter rescue following a jet pilot's over-the-desert ejection, the rescuee made two good points in his survival narrative:

"I would like to re-emphasize the feeling one has to want to leave the scene—it is something that must be guarded against. I was very certain that rescue was on its way since circling aircraft had acknowledged my signals. However, with the prospect of a cold desert night on hand, there was temptation to want to try to seek shelter elsewhere, and it had to be resisted. This is particularly true when there is no search on the way, or no assurance of search on the way. Stay put!

"A point in helping those who would help you: if you have the ability to assist the rescue aircraft in any way, and by this I particularly mean the helicopters, use some consideration in finding a spot or assisting the helicopter pilot in putting down because if he has trouble, he could possibly join you in your predicament."

Hits Gunsight

WHEN the engine of an A1H (AD-6) failed shortly after take-off, the pilot landed wheels up in a clear area off the end of the duty runway. The aircraft contacted the ground at approximately 80 knots in a slightly nose-high attitude. The pilot's head snapped forward on impact. Having failed to tighten his shoulder harness snugly, he struck the gunsight with enough force to split the visor down the middle and daze him momentarily. The aircraft came to rest in an upright position after 233 feet of travel. He left the

aircraft and ran a safe distance away.

The investigating flight surgeon reported that this was the second time in two months that a pilot in this squadron hit his head on the gunsight and broke his helmet visor yet was unhurt. In both cases, wearing the helmet visor down prevented serious injury.

Number Up

AFTER rescuing a jet pilot from the ocean, the motor whaleboat crew saw that he had reflective tape on his helmet although they had failed to see it in the dense fog. The investigating flight surgeon attributed this to the fact that only the pilot's squadron number was taped on each side. He recommended that "a significant percentage of the surface of the helmet be covered with this tape."

See BACSEB 1-60 for a good recommended application of the reflective tape.

Another Knife Save

A HANDY survival knife saved a pilot from drowning when he ejected over water too low to set himself up for easy shedding of his parachute. With time only to release his chest and leg straps, he found himself being dragged through the water by the inflated chute which was still attached to him by the liferaft lanyard connected to the raft and the stretched-out bailout bottle hose.

Fighting to keep his head above water, he took a deep breath, went under, took his knife from its sheath on his right mid-thigh and cut the lanyard and hose. Surfacing, he inflated his life preserver and rode the 10- to 15-foot swells until rescued by helicopter.

Turn To

COMMENTING on the improper utilization of personal equipment on the flight deck, a spokesman in carrier safety council minutes stated:

"It is noted that the lower rated men are not exclusively at fault in this—helmets unbuttoned, goggles not in place, sleeves rolled up, . . . Top rated petty officers and officers are sometimes equally negligent. I recommend we give the air officer a hand in his battle for a continuing high standard of flight deck safety.

"First, we must be sure that any of us that are on the flight deck in other than a pilot status during operations are properly attired. Then, after the example is set, we must enforce that example. I look forward to the day when the air boss tells flight deck personnel to 'roll down sleeves, button helmets and put goggles in place' and more than a small minority actually turn-to right then and follow his instructions. When we have everyone turning-to immediately our flight deck will be a much safer place."

"But Doc, that chart doesn't prove I'm too heavy—it just says that I'm not tall enough."

Ditching Drills

DITCHING drills are being conducted regularly but mostly during daylight flights. It was recommended that more emphasis be placed on night ditching drills with the aircraft in the chocks and the electrical power secured.—*Safety Council Minutes*

"Help!"

THICK fog complicated the search for and rescue of an F3B (F3H-2) pilot who ejected over water. The pilot could barely see the lights of aircraft passing overhead. After boarding his raft he lit his flares, fired tracers and turned on his vest light.

"I could hear various ships' fog horns around me," he stated later. "I had run out of tracers and flares so I simply threw back my head and screamed the loudest 'Help' I had ever done. I followed this with loud whistles. I heard someone shout that they heard me and I could barely see a destroyer coming slowly toward my position through the fog. I was picked up by the destroyer's whaleboat. . . ."

Both the tracers and the vest light were visible to the whaleboat crew through the fog.

In the Dark

CAUTION is called for in aircraft maintenance operations—especially at night.

At about 2300 the maintenance crew finished a 30-hour check on an C-54 (R5D). Turn-up check was completed and the plane was secured. A maintenance crewman leaving the aircraft walked down the dark passageway without a flashlight. Someone had removed the baggage compartment access hatch in the floor Result: The crewman fell through the opening and broke several toes. ●

Shoot Seat Sense

By Marine Captain Louis C. Pritchett
and Leon A. Yeaton, AMEC

The first ejection from a naval aircraft occurred on 9 August 1949 when LT J. L. Fruin punched out of a *Banshee*. The ejection was initiated at 25,000 feet and a speed of 520 knots after the aircraft had entered a spin. LT Fruin pulled the ripcord at 1000 feet after having difficulty locating the ripcord handle because his life vest had inflated. LT Fruin received serious injury during the ejection but all in all it was a successful ejection.

Since the first ejection, there have been 1025 ejections. The ejection seat made it possible for many Navy pilots to save their lives.

Escape systems have been greatly improved since the installation of the first ejection seat. In the early types of escape systems each sequence of the operation was manually operated. The pilot actuated the face curtain or arm rest (no alternate method of ejection was furnished) which catapulted the pilot, survival equipment and seat from the aircraft. Once clear of the aircraft, the pilot had to release his seat belt and kick free of the ejection seat. If at low level, the pilot then actuated his parachute ripcord. If ejection was at high altitude, he fell free to a lower altitude before deploying his chute. If the pilot was incapacitated at any time before deploying his parachute, he was fatally injured.

Years ago it was realized that many in-flight emergencies (during landing, takeoff, low level flight, . . .) occurred when the aircraft was outside the envelope of the existing escape system. This brought about the invention of the automatic lapbelt, parachute actuators, and canopy jettison systems. Now, it is only necessary for the pilot to initiate the ejection and the other sequenced operations of the system are automatic.

To accomplish this low level escape, it was necessary to incorporate a number of ballistic charges, mechanical actuators, gas lines, mechanical linkages, and drogue chutes into the escape systems. Since no time is available to the pilot for manual actuation once the sequence of escape has been initiated, all of these automatic features of the escape system must function perfectly. *One discrepancy can render the entire system inoperative.* This is why great emphasis *must* be placed on quality maintenance and stringent supervision . . . a chain is only as strong as its weakest link.

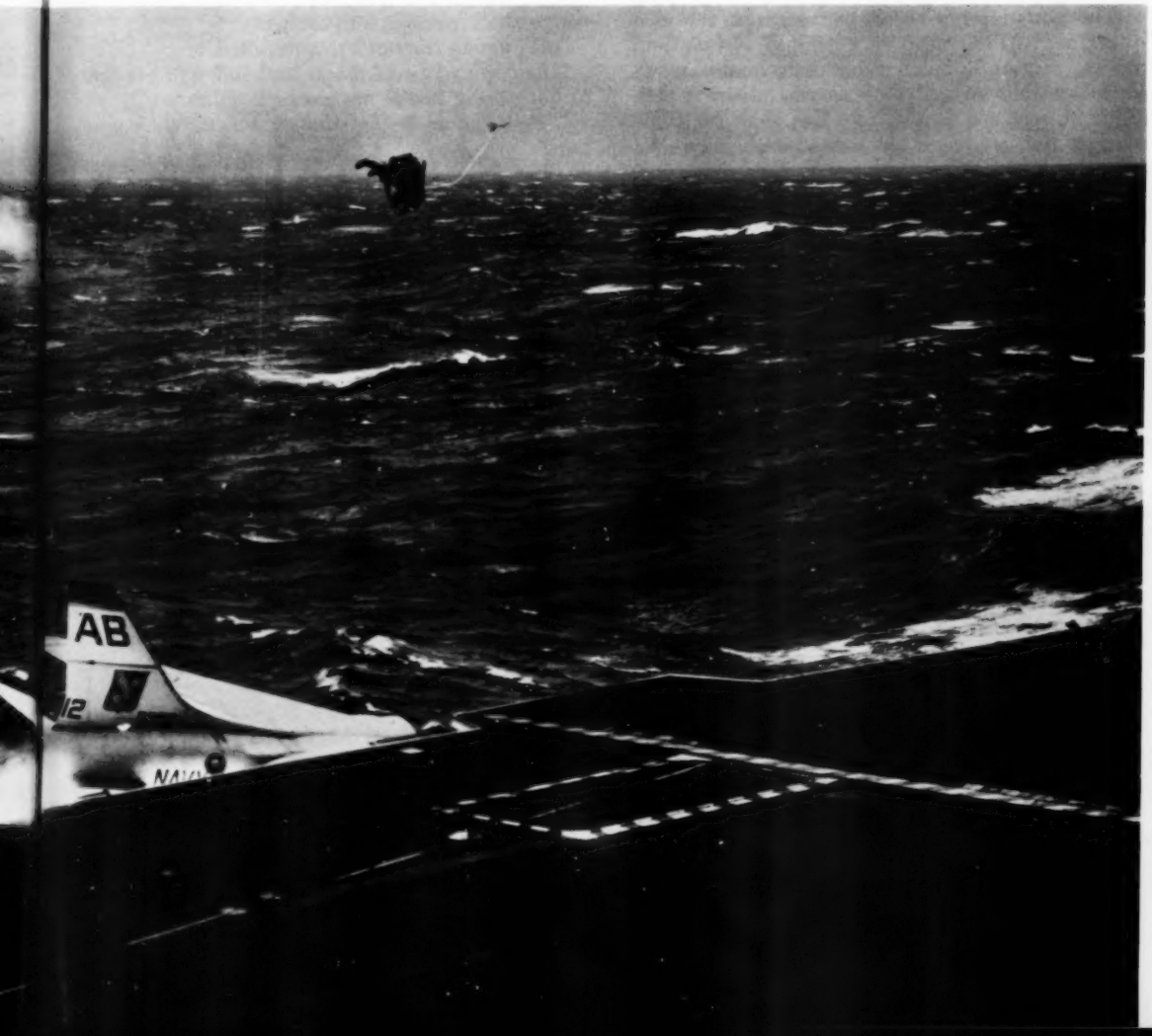
Every effort should be made to insure 100 percent reliability of the escape system. *The pilot does not rely on the proper operation of any other aircraft system for survival as he does the escape system.* Once the ejection has been initiated at low level, the pilot's survival is dependent entirely on the proper operation of the escape system. No time is available to overcome or correct any malfunctions of the system. The pilot is entirely at the mercy of the system, and the mech who installed it in the aircraft.

It's a one shot system. Either it works or it doesn't.

It's a pretty sad day in any squadron when a pilot is killed because a seat failed to operate properly.

It's real personal business.

Yet, in the past few months, we've been finding, by look-see, word-of-mouth, phone calls, Anymouses and the grape-vine, an alarming number of unreported maintenance errors in escape systems. Naturally, our first thought when we hear



of these things unofficially, is to wonder how many of them are *unreported* – and what is infinitely more important, how many of these unknown potential fatal ejections are flying around at this minute strapped to a pilot. It's like having a chute packed with rags.

During a recent visit to some A-4 (A4D) squadrons we found that some pretty unnerving situations existed. Ejection seat maintenance people were not as familiar with the systems as they should be. And, in many instances, they were relying on their own personal knowledge of, and abilities with the systems in making necessary checks, and in complying with published BACSEBS, BuWeps Instructions, and Aircraft Bulletins, rather than referring to the appropriate instructions and maintenance manuals for guidance. Also, an alarming number of people working on these seats had *no formal training* on the seat.

This complacency seems to stem from the idea that the RAPEC seat is a simple system and doesn't require so much attention to quality work. It doesn't take an analyst to see the fallacy in this. Shoe strings are simple, too, but they do come untied. But, we're not concerned with logic. We are much concerned about the sad situations which we know exist in some squadrons.

In one case, overrated pride in one mech's capabilities was discovered by an Overhaul and Repair Department. An F-8A (F8U-1) was inducted for overhaul, and during breakdown, the seat was found to have a locally fabricated part installed vice the proper assembly. This particular assembly has tolerances so close that even the O&Rs won't touch it. It comes directly from the seat manufacturer. If a pilot had been forced to use this particular seat, chances are he wouldn't have made Happy Hour next Friday.

Most disturbing are these excerpts from accident reports:

"Ejection was unsuccessful due to an unauthorized locally manufactured part installed which caused malfunction . . . ."

"Failure of maintenance personnel to . . . ."

". . . . improperly assembled."

"Wrong size . . . ."

". . . . would have been discovered if a functional check had been performed in accordance with . . . ."

". . . installed in reverse."

"Not torqued in accordance with . . . which precluded proper operation."

"Improper size thread used for safety tie."

"Did not operate due to failure of maintenance personnel to install P/N . . . ."

"Pilot received fatal injuries because ejection sequence was interrupted due to failure of maintenance personnel to properly . . . ."

". . . . would have been prevented if proper inspection had been performed in accordance with. . ."

"Inspection was performed by untrained and unqualified personnel."

"Incomplete quality control inspection . . ."

"Ejection was unsuccessful due to failure of maintenance personnel to connect . . . ."

". . . . wrong cartridge was installed."

"Canopy and ejection seat both failed to fire due to both firing heads not properly adjusted."

". . . . failure to fire due to uncocked drogue gun."

We also know of the brand new squadron CO who launched off in his trusty iron bird leading a squadron fly-by.

As he was crawling out of his airplane, reflecting on what a fine show they had made and what a grand maintenance department he had to have put all the birds up for the show, plus two spares, the red-faced plane captain sheepishly mentioned that the Skipper should note on the Yellow Sheet that the firing head on the ejection seat was missing. Sure the CO should have noticed that on the pre-flight, but there just can't be any reason for letting the Old Man – or any pilot – go in a bird rigged like that.

An analytical look at these personnel errors makes four points stand out like a fire warning light on a night IFR approach. In the great majority of these cases, adequate attention to any one of these areas would no doubt have prevented the discrepancy. These are:

(1) Lack of school training – hence, lack of really accurate knowledge of the system.

(2) Lack of attention to detail in shop work and non-adherence to published instructions–lack of supervision.

(3) Complacency among the shop troops concerning their own knowledge of, and abilities with the system.

Continued

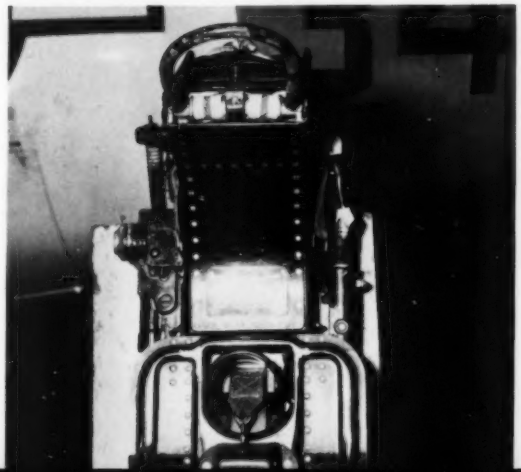
Escape Goat

A-3 (A3D) Escape Chute. Pilot's comments, "Handle pulled out sharply to stop. Nothing happened." Pilot is QC Officer. No comment.

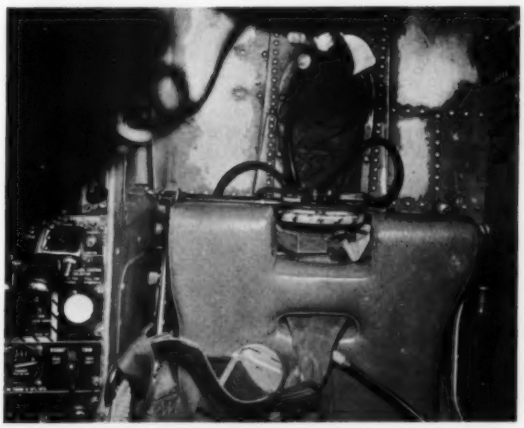
RAPEC EJECTION SEAT: Does this man realize what a dangerous situation he has placed himself? Many reports indicate numerous injuries sustained by maintenance crewmen while performing routine maintenance. Disregard for safety as exhibited here could cost this man his life. What has this man failed to do before working on this ejection seat? Ans: The ejection control safety handle is STOWED. This situation allows the ejection control pulley mechanism to rotate with the possibility of canopy jettison and ejection seat firing if the curtain is pulled. With the ejection control safety handle in the full DOWN and the catapult safety pin and canopy initiator safety pins installed, the escape system is safetied.

What's wrong...

MARTIN BAKER MK-A5 SEAT: This ejection seat has been removed from a TF-9J (F9F-8T) aircraft. While pulling a maintenance check on this seat what discrepancy should be corrected?
Ans: The face curtain handle has been installed in reverse. A shipment of new face curtains was received this way. These curtain assemblies were all withdrawn from the supply system when the discrepancy was discovered by fleet activities. This is another example of the need for reliable maintenance strict quality control, and field reporting of discrepancies.



RAPEC EJECTION SEAT—While pulling an acceptance check on this A4 (A4D) Rapec ejection seat this mechanic is checking to ascertain incorporation of all modifications as directed by Bu-Weps. What bulletin has obviously been complied with?
Ans: BASCEB 15-62 has been incorporated on the face curtain. This is determined by measuring the length of the face curtain when extended with the ejection control safety handle DOWN. This change shortens face curtain 2" to provide the pilot a shorter pull on the face curtain to initiate ejection. Another improvement in the ejection cycle is the lowering of the pull force required to initiate ejection. These changes were mandatory after investigation revealed some pilots had extreme difficulty in initiating ejection.



MARTIN BAKER—This TF-9J (F9F-8T) aircraft, equipped with Mk-A5 ejection seat, has been downed for minor discrepancy to be corrected on the escape system. What must be done before performing any maintenance on this ejection seat? Ans: The secondary firing handle safety guard must be UP. This handle requires approximately 1" of travel to fire the ejection seat. This safety guard should be placed in the safetied position by the pilot immediately upon landing, and must stay in this position until the pilot is again ready for takeoff, or the seat has been de-armed prior to performing maintenance. Some pilots have flown with the guard UP but this is "not recommended" due to the delay encountered when making a low level ejection when a split second may mean the difference between a successful ejection or a fatality.

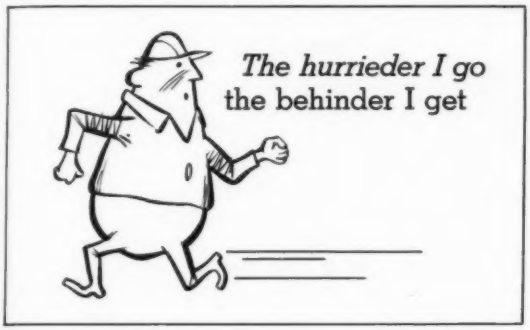
(4) Inadequate and/or incomplete quality control.

These are deficiencies which we know exist in some squadrons. We hope it isn't true of yours. Situations and attitudes like these in the seat shop could destroy the entire quality maintenance program.

On the other hand, some outfits put proper emphasis on the matter. Here's a report from Gunnery Sergeant G. D. Stark of VMF-451:

Training in all phases of aviation cannot possibly be overemphasized if safety for all concerned is kept in mind. Pilot/crew ejection procedures, maintenance procedures are just two of the many important phases. In the training of personnel on almost any subject, the training aid is invaluable. To see and operate working mock-ups greatly increases a person's learning and retention of subject matter. Working from this theory, members of this unit have devised an ejection seat training aid that simulates the actual ejection sequence of

AIR OPERATED Martin Baker ejection seat, right, is demonstrated below by members of VMF-451. This training aid is used to train mechanics in maintenance and pilots in ejection procedures.



the Martin-Baker ejection system.

The ejection seat training aid devised by this unit is offered for consideration by other units.

Factors in favor of this device are:

(a) Each squadron concerned can readily construct a similar seat thereby easily permitting frequent training.

(b) The device is compact and mobile.

(c) The seat is complete and (with minor modifications) simulates an armed seat.

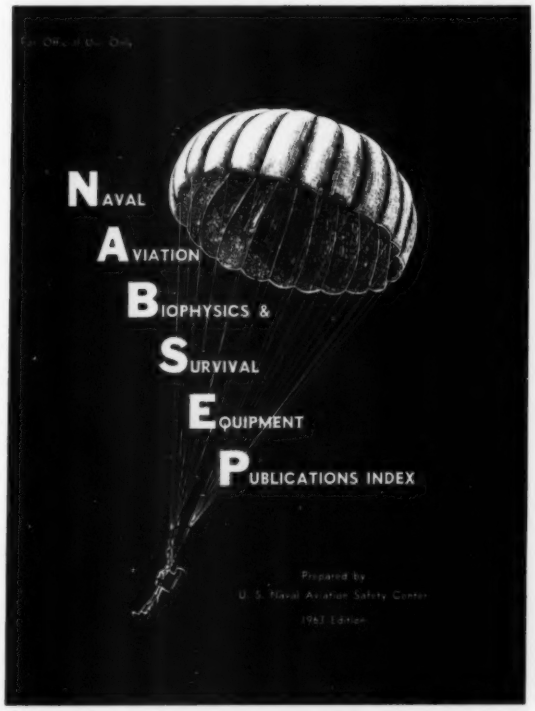
(d) More pilots can be taught seat function and procedure. Cockpit space normally limits the number of persons attending briefings.

(e) Maintenance personnel can easily acquaint themselves with assembly or disassembly of the seat without affecting, or concern for, aircraft availability.

The ejection seat training aid now used in this unit is made almost entirely of salvaged parts. These parts should be reasonably easy for similar units to procure from the air station salvage yard. The seat is an F-5 Martin-Baker ejection seat which was used and salvaged from an actual ejection. A Martin-Baker A-5 ejection gun was used in place of the F-5 gun. The system is operated by compressed air which forces the seat and occupant to approximately three feet when actuated (see photos). The cradle which supports the entire unit is a standard ejection seat maintenance cradle (PN 105 GT 1034-13).

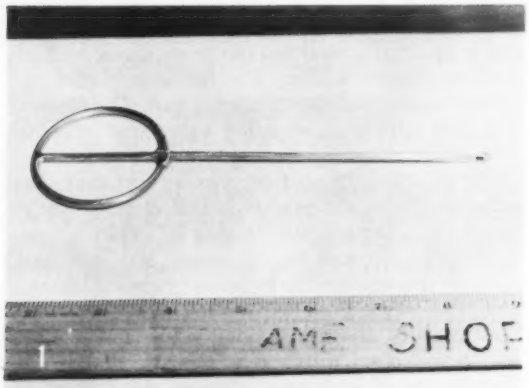
For assembly, ¼" steel plating was bolted to the vertical structure and cradle base on the seat side. The ejection gun outer barrel was welded to the steel plating. The inner barrel was converted into a piston by blocking off the hole at the bottom of the barrel, it is the only moving part of the gun assembly. The outer and intermediate barrels were tapped at the bases to accommodate a high pressure fitting. A high pressure line was routed from the gun base fitting to a pressure regulator (type XAMO77 from air nitrogen trailer). A high pressure bottle is also mounted on this side and is similarly connected to the regulator by high pressure copper tubing. The bottle is placed upright in an aircraft part shipping can. The ejection seat face curtain cable relief valve was attached to the regulator and adjusted to relieve at 1000 psi. Once actuated by either primary or secondary firing methods, the seat is halted after 3 feet of travel by a bungee cord and a ¼" cable.

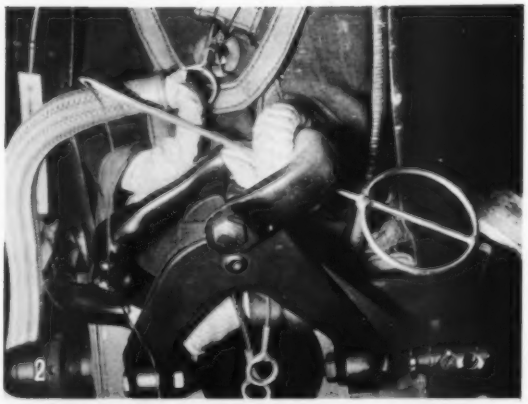
The seat has now logged nearly 100 "ejections" and has proven itself to be an outstanding training aid in all respects. This training aid has contributed greatly toward making pilot and maintenance personnel training as realistic and educational as possible. It is our sincere wish that others may benefit from a similarly constructed training aid and that it may someday assist in preventing a fatal statistic. ●

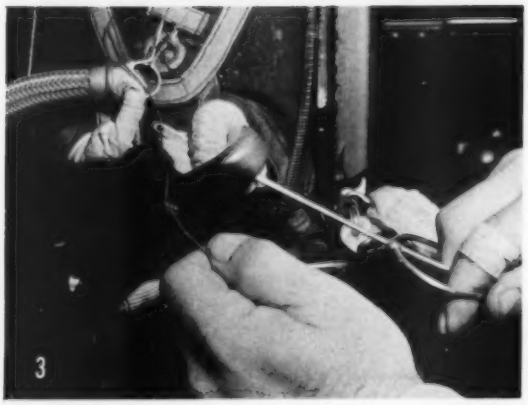


READY REFERENCE—This Index, just off the presses was compiled to aid Riggers and Shoot Seat Mechanics to keep abreast of emergency and survival equipment publications. For a copy see your Aviation Safety Officer or write: Commander, U. S. Naval Aviation Safety Center, Norfolk 11, Va.

NOTES AND COMMENTS ON MAINTENANCE







THREADING TOOL. Photo 1, devised by VF-13 provides easy means of securing drogue shackle, photos 2 and 3, as required by BACSEB 7-62.

Threading Tool

Problem: It is difficult to thread the no. 6 cord through the Drogue Shackle and Drogue Rope Loop as specified in BACSEB 7-62. The no. 6 cord is necessary to secure the Drogue Shackle to the wire eyelet to prevent the Drogue Shackle from raising from its fully down position. As this is usually the last adjustment that is made when the Drogue Chutes are packed, little space remains between the Drogue Shackle and Rope Loop to thread the tiedown cord through this assembly.

Solution: This problem has been eliminated by a locally constructed tool, devised by L. W. Steward, AME2, of VF-13 based at NAS Cecil Field. The tool was constructed from standard brazing wire (photo 1). The eye was drilled in the rod after the tip had been flattened to provide the necessary drilling surface. The tool is shown in use photos (2) and (3). The tip of the tool was rounded and polished to prevent possible damage to the rope loop material.

This simple and effective tool can be easily constructed by squadron personnel. It provides a rapid method for performing a maintenance function that has previously been time consuming and tedious.

Recommendation: That the development of this tool and its purpose be brought to the attention of all ejection seat personnel, and that it be given consideration as an addition to standard Martin-Baker Ejection Seat Tool Kits.—*M. C. Carter, NAESU*

Forklift Fatality

THE LINECREW engaged in washing down a transport aircraft forklifted a man standing on a pallet to wash the wing. The forklift operator's foot slipped from the clutch with the vehicle in reverse gear. The forklift lurched aft causing the man on the raised pallet to fall, strike his head on the ramp and to receive fatal injury.

Forklifts are probably the most utilitarian of all vehicles and are put to a wide range of uses. At the same time these vehicles are among the most dangerous in the hands of unskilled and inattentive operators. Care in the selection of operators and caution in the usage of this equipment is a must at all times.

Weapons Test?

THIS particular A4 squadron was planning for a few days of *Bullpup* firing. As usual the reconfiguration did not go as fast as was expected by operations. On the day the first launch was to go, the wiring checks and reconfiguration had not been accomplished. One of the checks calls for a checkout of the *Bullpup* jettison system. To do this the emergency release handle must be pulled. The ordnance crew had the wing stations ready and a safety pin was visible in the centerline external fuel tank. Sure enough, when the jettison handle was pulled, the centerline tank jettisoned and was thrown to the ground by the breech caps, rupturing the tank. Luckily, very luckily—no one was in the position to be crushed by the tank.

Upon investigation, it was found that the safety pin was in the rack all right, but not seated properly. To SAFE the cartridges the pin must make both a mechanical and electrical contact. The pin was not positioned properly to do this. The pin had been placed in the rack from the port side rather than the starboard side. This meant that it had to be fully in position to SAFE the rack.

This is another case of rushing the checklist to get the job done in time. In the first place, the line plane captain was at fault for not properly checking to see that the safety pin was seated. The ordnancemen and technicians should have physically checked the pin, especially since this is one of the rare times the jettison handle is pulled. Also, the breech caps should be removed before testing the jettison system, as another safe procedure.

Why depend on the pin? A review of procedures has been in order in the squadron and other squadrons could possibly check their divisions more closely to detect any short cuts to disaster.—*Anymouse*

Power Plugs

TO PREVENT inadvertent power application to aircraft undergoing maintenance FAirReconRonOne manufacturers false plugs bearing sign

"NO POWER TO BE APPLIED".

These plugs are used in power receptacles of squadron aircraft. The shop inserting the plug notifies the Maintenance Chief who, in turn coordinates the maintenance crews. Before the plug is removed, an okay must be received from the Maintenance Chief. This system should help prevent crunches, injuries and landing gear collapses. Why not give it a try?

COFFEE BREAK—Plastic coffee cup, indicated by arrow, jammed horizontal stabilizer actuator.

Kafe Klatch

THE AIRCRAFT, an A-4 (A4D), had just completed a calendar periodic inspection and had flown several flights without incident. During the pilot's preflight it was noted that the horizontal stabilizer would not travel to the fullup nose-up position.

Imagine the electrician's surprise when he removed the access panel and staring at him was a crushed plastic coffee cup! This coffee cup was jamming the horizontal stabilizer limit switches located on the actuator assembly.

It is almost unbelievable that an object this size could be sealed up inside an aircraft—but it happened. No access panel, regardless of size or location, should be replaced prior to an inspection by a qualified quality control inspector.

Good Headwork

AN F-8 (F8U) Plane Captain displayed good headwork when a wave in rough seas engulfed his aircraft while in a lowered position on a deck edge elevator. Here's what happened:

The aircraft was spotted, nose inboard, on the forward edge of the no. 1 elevator. Nose gear tiedowns had been attached but the main mounts were in the process of being attached. As the wave broke and others attending the plane sought cover, the plane captain in the cockpit blew the emergency brake bottle.

Impact of the wave broke a nose-gear tie-down, caused the aircraft to skid 43″ with brakes locked. Impact damage to the aircraft resulted in imploded cockpit canopy, sheared main landing gear axle, sheared nose gear trunnions, broken starboard wing panel hinge fittings, damaged fuselage and an undetermined amount of interior damage.

APPROACH salutes Plane Captain R. T. Russell, ADJ3, of VF-141 for heads-up thinking and action.

NITROGEN—Water-pumped vs Oil-pumped

One-Bar Two-Bar Fubar

A mixup in the use of two types of nitrogen caused considerable consternation when oil-pumped nitrogen was used to purge an A-4 (A4D) liquid oxygen system. Luckily an explosion did not occur at the time—the system was empty. To preclude an explosion when the system was refilled all the plumbing was removed and cleaned.

Purging of oxygen systems requires the use of clean (water pumped) nitrogen. While clean nitrogen may be used without hazard for inflation of tires and struts, it is expensive. Oil-pumped (dirty) nitrogen, which is much cheaper to produce, is therefore used for the latter purposes.

With heavier aircraft and high pressure pneumatic systems the use of dirty nitrogen has become a regular practice in many outfits. Its use prevents dieseling of oleo struts and reduces the hazard of exploding tires from hot brakes.

Herein lies the crux of the problem. On one hand, the presence on the line of clean nitrogen is absolutely essential to service oxygen systems. On the other hand, the presence on the line of dirty or cheap nitrogen is also essential to prevent costly accidents of the type just mentioned. Incorrect use of either can be expensive. To get the job done operators must be alert at all times to the hazards present. Both types are dispensed with similar carts. Only the markings on the bottles containing the nitrogen are different—but the difference isn't so much that the uninitiated might not overlook it. Both are gray colored bottles—oil-pumped nitrogen has one black band, water-pumped nitrogen has two black bands. Please note the illustrations. Both should have identifying labels in 2-inch lettering—but as often is the case these may not be readily visible.

Military Standard 101A of 13 August 1961 states the significance of the gray colors labeling compressed gas cylinders: "Physically dangerous materials. All materials, not dangerous in themselves, which are asphyxiating in confined areas or which are generally handled in a dangerous physical state of pressure or temperature."

Use of black and white . . . "without significant meaning." Don't take this last statement too literally—Black stripes take on a *most* significant meaning when it comes to identifying clean and dirty nitrogen. So, before you blow—*know!* ●

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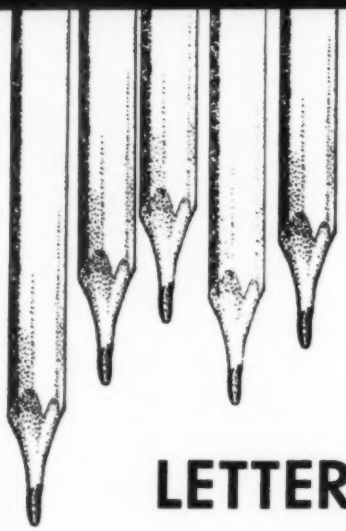
Attention Aviation Safety Officers: This index should be removed and made an addendum to APPROACH CUMULATIVE INDEX, July 1955 - June 1962 in your Aviation Safety Officer's Guide.



LETTERS TO APPROACH

Lift and Live

Patuxent River, Md.—As a hard working student at the U. S. Naval Test Pilot School, I had just finished hearing about the means by which lift is generated on our aerodynes and picked up the May issue to learn a little more from your article, "What's Your Angle." Boy, has the author of that article ever got problems! With reference to the second to the last line on page 15 — if this is the American technique, vive-la Canadian one! Here's to a better life, Cheers.

A. J. PUDSEY
Squadron Leader, RCAF
U.S. Naval Test Pilot School

► The problem is strictly typographical. The sentence should have read: "To generate LIFT we must either change the shape of the airfoil and/or change the angle of the cord line to the airflow."

P.S. The author uses the same technique as Canadians.

Destroyer Rescue

Washington, D.C.—Permission to reprint Major H. G. C. Henneberger's excellent article "Destroyer Rescue" in the May 1963 issue is requested. The purpose of the reprint is to distribute the article to Coast Guard Rescue Cutters.

Chief, Search and Rescue Division
R. F. SHUNK, CAPT, USCG

Will Write

NAS, Miramar, Calif—I just finished the January edition (being no. 11 in line) and found LCDR Goode's coverage on CCA to be quite comprehensive and informative but somehow I can't help but wonder if the full story is being told now that the SPN-10 automatic landing system is upon us. On the bottom of page two there is a comment concerning the distance to go in achieving perfection of carrier operations. If my contribution of an article on the SPN-10 system would be as enlightening as LCDR Goode's then I would be most happy to do it.

Somewhere, sometime I ran across a bit of information about contributing articles for possible printing in APPROACH magazine but an exhaustive search has evidently proven me wrong. This bit of information covered the criteria for submission of articles with respect to format, context, etc., and was in general a swell guide.

LOUIS E. SCOTT, ACCS P-1

• Your article would be most welcome. For format details see page 2, of July 1961 issue—"By You, For You, About You."

T-58 Maintenance Training

Memphis, Tenn.—Naval Air Maintenance Training Group considers the article "Wash or Pit?" on pages 36 through 42 of the May 1963 issue an outstanding contribution to the battle against corrosion.

NAMTraGru is responsible for providing engine maintenance training on the T-58-8 engine. At the present time, NAMTraDets are training fleet maintenance personnel on the T-58-8 Engine from Class "C" through "F" maintenance at NAS Key West, NAS Lakehurst and NAAS Ream Field.

It is requested that this command be provided with 1000 copies of the entire article, including photographs. It is the intention of NAMTraGru to to use the article, with a suitable cover sheet, as handout material for the T-58 maintenance class students. NAMTraGru feels that each student should read, heed and keep this outstanding article for future reference.

R. E. LARSON
CO, NAMTG

• They're on the way.

Flight Deck Survival Packet

FPO, San Francisco—There have been in the past many tragic flight deck accidents in which flight deck personnel have either been thrown, or have fallen over the side of aircraft carriers during flight operations. With this thought in mind, the survival equipment division of VA-212 is requiring all squadron personnel whose duties require them on the flight deck during flight operations to wear our flight deck personnel survival packet.

This survival packet has met with enthusiastic approval by VA-212 plane captains and maintenance personnel who serve long hours in a hazardous environment. From the picture it can be seen that the packet is lightweight, small, is hooked around the belt, and has all the necessary devices for day or night signalling: whistle, day-night flare, and flashlight. VA-212 feels this survival packet is pretty cheap life insurance for our personnel who are required to work on the flight deck.

W. S. FLEMING, LT
ATKRON 212

• Several squadrons have devised similar gear for flight deck personnel. The ideal solution, of course, would be lightweight flotation gear and signaling devices. NASC has forwarded to BuShips for consideration various flotation devices for shipboard personnel as survival protection in the event of over-the-side carrier accidents. In answer to a recent "forwarded for consideration" letter to BuShips, the Safety Center received the following reply:

"The Bureau is aware that the present work type life preserver is bulky and restrictive. Work is underway to develop a combined inherently buoyant and inflatable preserver which will provide sufficient initial buoyancy to properly support an injured man in the water. This preserver will be less bulky and less restrictive than those now in use. Com-

pletion of an initial prototype model is scheduled for March, 1963."

(See APPROACH, March 1963 for Headmouse discussion of "Man Overboard" problems.)

CCA Glide Slope Radar!!

U.S.S. Kearsarge—On page 23 of the March 1963 issue you state "CCA controllers do not have the radar glide slope information available to the GCA controllers." In keeping with the title, "Most Modern ASW Carrier," the KEARSARGE under the technical and operational guidance of the Bureau of Ships and DepComOpTevForPac recently completed a six-month test and evaluation of a transistorized precision glide slope radar, the AN/SPN-35.

In April 1963, the final installation of the first production model of this equipment was completed on KEARSARGE. To date, over 2000 CCA precision prop, jet and helicopter approaches have been completed. The flexibility and capability of this equipment indicates, that if operational necessity dictates, a recovery under actual IFR conditions can be safely and successfully completed down to ¼th mile and 100 feet. It must be noted here, however, that the present minimums have been established by the type commander at 200 feet and one mile visibility.

Due to the previous GCA training that both pilots and controllers receive, a rapid transition to this glide slope addition to the CCA is realized with little changes in existing CCA/GCA procedures. In addition, the compactness of SPN-35 components provides more efficient and effective arrangement of equipment in CCA spaces.

E. P. RANKIN
COMMANDING OFFICER

► **Thanks for the information, Captain. The SPN-35 should be a welcome addition to both CCA controllers and pilots.**

Phone Cord Gadget

Meridian, Miss.—In regard to the headphone cord used on the APH-5 hardhat, the presently installed cord is uncomfortable and tends to catch on the harness when used in conjunction with the pressure breathing mask.

The spring attachment (see photo), in conjunction with the shortened cord, has proved itself a simple but practical solution. The jack is always readily accessible and affords complete freedom of head movement to the pilot. A simple coil spring with a loop at each end is used. One end

is inserted around the bolt between the Sierra fitting and the helmet. The other end is attached to the cord as shown. The cord itself can be shortened and spliced, but coiling it behind the neck with a piece of tape is a simpler and acceptable expedient.

G. E. BROWN, ENS
VT- 7

● **Your idea is a good solution to a very annoying problem.**

Unified Services

Center Line, Mich.—Your articles on maintenance contained in the April '63 issue were most informative. If it's any comfort, this problem is not peculiar to Naval Aviation.

We will appreciate it very much if you could forward three copies of "Mech 62" for our use.

L. E. COOK
Quality Control Spec (Aircraft)
U. S. Army Mobility Command

You and MEE

Hants, England—With reference to "You and MEE" April issue I wonder if you could spare a copy of your publication "Mech 62" for use by this centre.

I would like to add that we find APPROACH an extremely useful magazine full of good tips and information.

Looking forward to "Mech 62" in jig time.

J. C. M. FRENCH, LCDR, R. N.
Flight Safety Centre
Wykeham Hall, Lee-on-Solent

● **Thank you sir, for the kind words —Mech 62's have been jigged.**

You and MEE

Burbank, Calif.—"You and MEE" appearing in the April 1963 issue was very interesting. As you know my department here at Lockheed specifically addresses itself to Maintenance Error Elimination through scrutiny of design for maintenance and analysis of personnel requirements and capabilities. Accordingly, the publication "MECH '62" mentioned in the article would be very useful to us and I would like to obtain six copies if possible.

F. D. ENFIELD, Dept. Mgr.
Human Eng. & Maint. Design
Lockheed Aircraft Corp.

● **Glad to oblige.**

Altimeter Correction

FPO, San Francisco—Correct me if I'm wrong but I think there's something amiss in Capt. Geiger's letter 'Direct Readout' in the May issue—29.92, I believe, should be set in the Kolsman window of your altimeter when flying above 24,000 feet, *plus* or *minus* your altimeter correction, i.e.,

Field elevation is 387′
Altimeter setting from tower is 29.99″
When your altimeter is adjusted to read 387′ your Kolsman window indicates 30.04″
Your altimeter correction is *plus* .05
Therefore, when flying above 24,000 feet you should set in *not* 29.92″ *but* 29.97″

Capt. Geiger's letter seems to imply that you always set in 29.92″ regardless of your altimeter correction. Am I wrong?

I realize that this is a nitpicking point but I'm jealous of anything that chips away at those precious few feet that separate IFR cruising altitudes.

KARL A. FOSTER, 1/LT
VMF(AW)-513

● **Capt. Geiger's letter does imply that 29.92 should be the standard setting above 24,000 feet. Whether or not this was his intention is not known. You are correct though, 29.92 plus or minus your altimeter error should be the setting used when flying above 24,000 feet.** ●

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

approach

NavWeps 00-75-510 THE NAVAL AVIATION SAFETY REVIEW VOL. 9. NO. 1

Purpose and policies: *Approach*, published monthly by the U. S. Naval Aviation Safety Center, is distributed to naval aeronautical organizations on the basis of 1 copy per 10 persons. It presents the most accurate information currently available on the subject of aviation accident prevention. Contents should not be considered as regulations, orders, or directives. Material extracted from mishap reports may not be construed as incriminating under Art. 31, UCMJ. **Photos:** Official Navy or as credited. Non-naval activities are requested to contact NASC prior to reprinting *Approach* material. **Correspondence:** Contributions are welcome as are comments and criticisms. Views expressed in guest-written articles are not necessarily those of NASC. Requests for distribution changes should be directed to NASC, NAS Norfolk 11, Va. Att: Safety Education Dept., if you are receiving the magazine free because of military or commercial contract status with the Navy. . . . IF YOU ARE A PAID SUBSCRIBER, address all renewals and change of addresses to Superintendent of Documents, Washington 25, D. C. **Subscriptions:** Single copy 15 cents; 1-year subscriptions $3.50; 2 yrs., $7.00; 3 yrs., $10.50; $1.00 additional annually for foreign mailing. **Printing:** Issuance of this publication approved by the Secretary of the Navy on 15 April 1961. Library of Congress Catalog No. 57—60020.

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Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

Wine or Water

A triumphal celebration was planned in a little remote Spanish town, and to insure adequate liquid refreshment, a great cask was constructed into which each citizen agreed to pour one bottle of his best wine.

"If I fill my bottle with water," reasoned one, "the dilution will be so slight nobody will notice."

But when the celebration commenced, and the cask was tapped, the contents proved to be nothing but water. Everybody in town had figured the same way—"My little bit won't be missed."

This, of course, is only a story, but let us compare it to accident prevention. Every man is expected to contribute his little bit to prevent accidents. He usually knows HOW and he knows WHY a job should be done a certain safe way. He is fully aware of the terrible consequences that can result from accidents. Yet there would seem to be many persons who have the same idea as the people in the little Spanish town—"My little bit won't be missed." But like the contents of the wine cask, any accident prevention program depends entirely on the contribution of everyone concerned.

If we change the word "cask" to "task," each one, then, who fails to contribute his little bit to the task of accident prevention detracts that much from its effectiveness. Unfortunately, there are still some people in all ranks "filling their bottles with water," giving lip service to accident prevention.

Accidents thrive on complacency, incompetence, lack of active interest, lack of team spirit and general negligence. Find an outfit where everyone is sincerely interested and truly concerned about accident prevention, and without doubt you will have found an outfit with a fine safety record.—***Adapted from an article by Alex MacKenzie "IAPA Bulletin" Toronto, Canada.***

LIFT and DRAG

APPROACH is distributed on the basis of one copy per 10 or so people in your unit. Pass this copy along to another shipmate. *The accident you prevent may be his!*